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Geomorphology of Deposits from the 2004 Indian Ocean Tsunami, Tamil Nadu, Southeastern India

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GEOMORPHOLOGY OF DEPOSITS FROM THE 2004 INDIAN OCEAN TSUNAMI, TAMIL NADU, SOUTHEASTERN INDIA

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ABSTRACT

GEOMORPHOLOGY OF DEPOSITS FROM THE 2004 INDIAN OCEAN TSUNAMI, TAMIL NADU, SOUTHEASTERN INDIA

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In low latitudes, geologically suitable repositories for tsunami deposits are not well defined. This project characterizes the geomorphic environments on the southeastern coast of India that preserved depositional evidence of the catastrophic tsunami created by the M_w9.0-9.3 Sumatra-Andaman earthquake on December 26, 2004. The Indian coast is particularly interesting because it is approximately 1300 km from the subduction-zone source of tsunamis across the Indian Ocean, and therefore only the largest events are capable of reaching it. The main objective of this study was to identify the settings where recognizable tsunami deposits from the 2004 event have been preferentially preserved in the stratigraphic record until 2008. These results will be useful in future attempts to discover and identify paleotsunami deposits in the geological record from India, and elsewhere.

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CHAPTER I

INTRODUCTION

Purpose

The impact of the 2004 Indian Ocean tsunami focused attention on the region and scientists began investigating for evidence of past large events. Recent paleotsunami and paleoseismic research around the Indian Ocean Basin (Monecke et al., 2008; Jankaew et al., 2008; Rajendran et al., 2007: Bilham et al., 2005; Kowalik et al., 2005; Okal and Synolakis, 2008) indicates that earthquake-generated tsunami have occurred in this region in the past (Monecke et al., 2008; Jankaew et al., 2008). The largest of these could have traversed the ocean and reached the southeastern coast of India, which highlights the importance of identifying key preservation sites in this potential repository of catastrophic basin-wide events. However, geologically enduring sites where tsunami deposits dependably survive are not yet well defined in India and other tropical environments. Despite paleotsunami substantiation in Sumatra, Thailand and The Andaman Islands (Monecke et al., 2008; Jankaew et al., 2008: Rajendran et al., 2007), and the possible existence of paleotsunami sediments at three different field sites in India (Srinivasalu, 2010), no conclusive evidence of paleotsunami deposits has been discovered in mainland India to date.

The December 26th 2004 Indian Ocean tsunami was generated by a M_w = 9.0-9.3 earthquake (Kanamori, 2006; Kowalik et al., 2005) associated with a rupture zone of approximately 1300 km (Bilham et al., 2005) with an epicenter off the northern coast of Sumatra at 3.307°N, 95.947°E (Merrifield et al., 2005). The event occurred as a result of

subduction-related stresses along the Indo-Andaman plate boundary. The rupture occurred at 06:29 India Standard Time (IST) (Chadha et al., 2005). The first wave struck the coast of India nearly three hours later at approximately 09:25 IST (Srinivasalu et al., 2007) after traveling approximately 1300 km.

The purpose of this project is to provide baseline data for future investigations of paleotsunami deposits by characterizing the geomorphic environments that have preserved evidence of the 2004 tsunami on the southeastern coast of India in the state of Tamil Nadu (Figure 1, Figure 2). The Holocene stratigraphy in northern Sumatra and coastal Thailand includes sand sheets that may record multiple, great tsunamis within the last 2800 years; the most recent of these occurred 550-700 years ago (Jankaew et al., 2008; Monecke et al., 2008). If there is stratigraphic evidence of these paleotsunami events in India, it may provide increased insight into the recurrence interval and extent of inundation of large, basin-wide events within the Indian Ocean which could reduce future loss of lives and property. There is sedimentological and paleontological evidence at three different field sites in southeastern India that suggest possible tsunami events about 700 and 980 years ago (Srinivasalu, 2010). Extending the number of Indian field sites with strong evidence of paleotsunami deposits could help to substantiate those initial findings. Because prehistoric tsunami deposits in tropical latitudes are still elusive due to relatively high weathering rates and typically sand-dominated grain size (Rhodes et al., 2006), this project will provide additional data to better characterize the physical settings conducive to the accumulation and preservation of tsunami deposits in southeastern India and similar environments.

Hypotheses

The hypotheses for this study were 1) the aseismic, tropical southeastern coast of India would contain stable geomorphic environments for the long-term accumulation and preservation of tsunami deposits. 2) the 2004 tsunami deposits would be preserved best on elevated, flat surfaces such as river terraces and behind coastal dunes; 3) there would be a distinct sedimentological difference between tsunami deposits and preexisting sediments; and 4) new descriptions in 2008 of tsunami deposits at the same sites where they were described immediately after the 2004 Indian Ocean tsunami would reveal similar sedimentological and stratigraphic characteristics.

Objectives

The following objectives were identified to test the above hypotheses:

1) Characterize the geomorphic environments where the 2004 deposits were best preserved and identifiable. Compare and contrasted those environments with geomorphic settings where the 2004 sediments were not deposited or recognizably preserved.
2) Develop a conceptual model based on field descriptions and sedimentological analysis to distinguish tsunami deposits from preexisting deposits derived from other sources.
3) Compare data collected immediately following the 2004 event (Srinivasalu et al., 2007) to data collected in this project to understand whether and how the deposits have changed in each geomorphic setting.

4) Determine the minimum age of the surfaces that were inundated by the 2004 tsunami. This objective contributed toward a better understanding of the rates of geomorphic and soil-forming processes in different environments within the study region to enhance the direction of future projects searching for paleotsunami deposits.

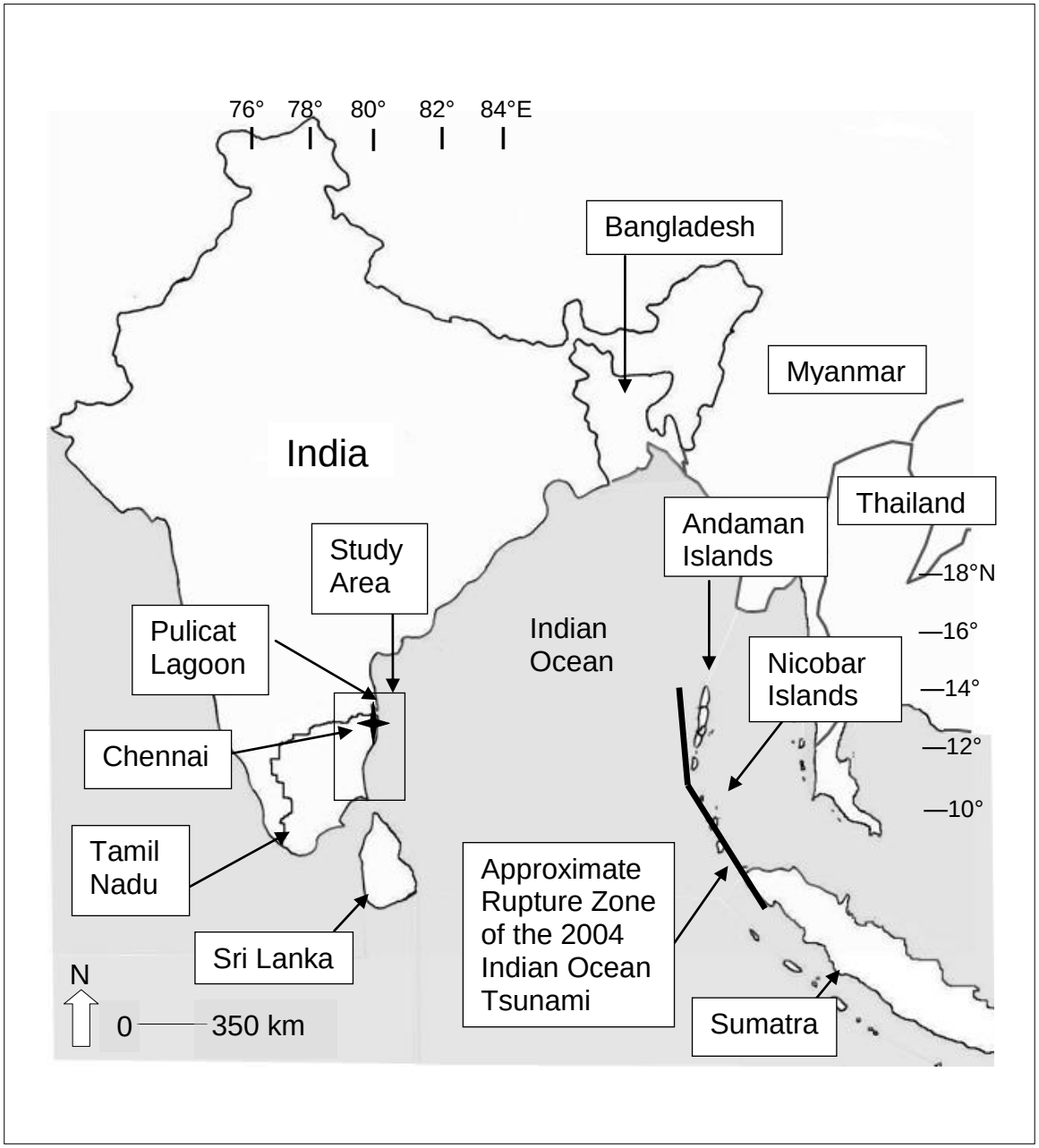

Figure 1. Study area and regional context. This project focused on 10-13 N latitude and 79-83 E longitude. The box around Chennai delineates the detailed map of the study area in Figure 2.

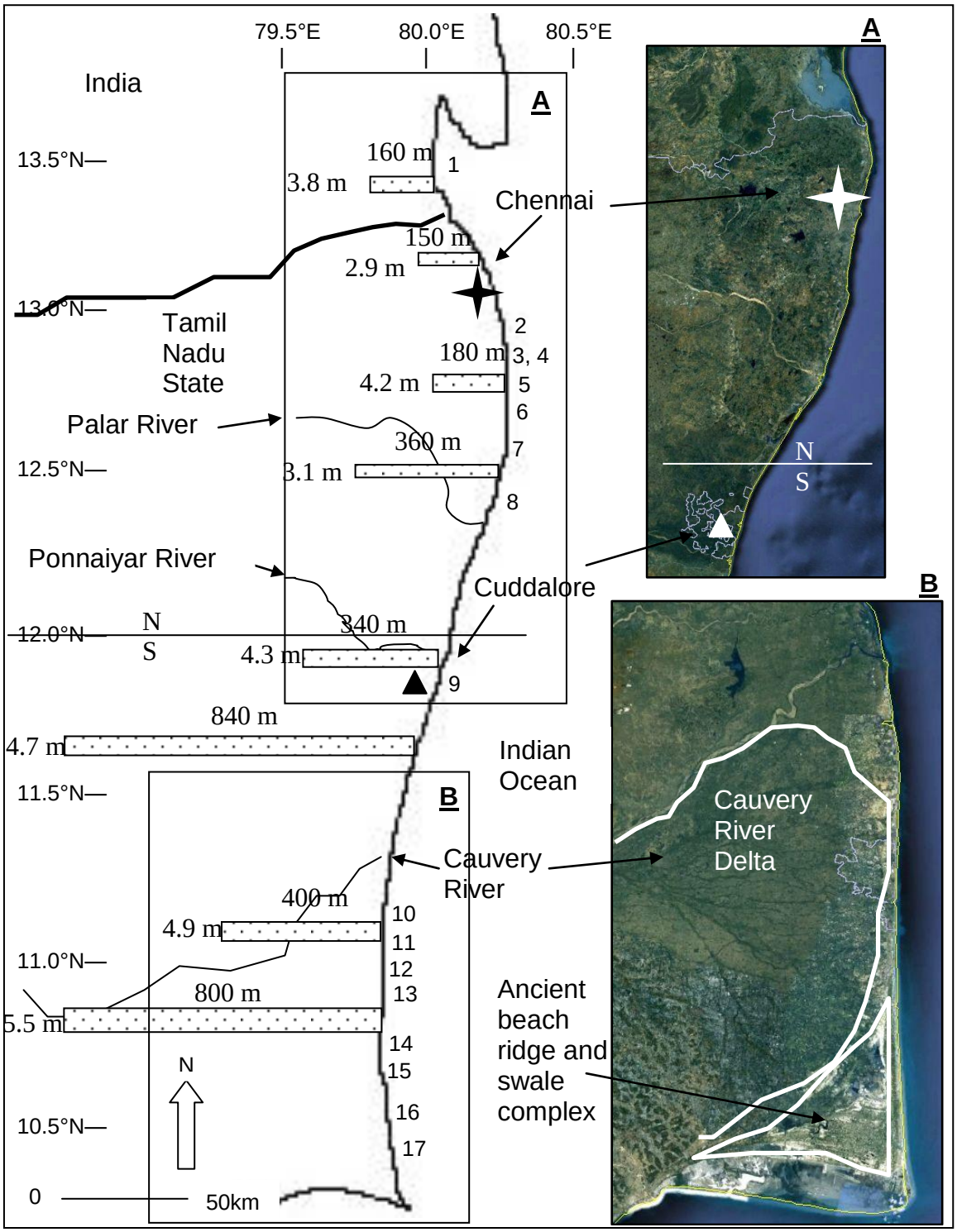

Figure 2. Individual study sites. The northern and southern sites were separated based on a grain size shift at Cuddalore (triangle); A. Northern sites (Google Earth), B. Southern sites (Google Earth); Inundation distance and run-up heights indicated by length and height of shaded boxes not drawn to map scale (Peterson et al., 2005); Sites are numbered as listed in Table 3.

CHAPTER II

LITERATURE REVIEW

Geomorphology

An evaluation of the geomorphic setting and geological evolution of a coast is fundamental to the process of identifying what and where to look for tsunami evidence (Goff et al., 2009). Tsunami inundation and run-up can be highly variable over relatively short distances, highlighting the effect of geomorphology on wave dynamics. Tsunami run-up is the tsunami's maximum vertical height above sea level at its furthest point inland. Tsunami inundation is the maximum distance inland that a tsunami wave traveled relative to the mean swash zone. The mean swash zone we used in this study is the sea level at approximately high-tide. As documented at over 5300 locations in Japan, tsunami run-up height tends to be exaggerated up river valleys and on steeper near-coast topography and tsunami inundation tends to be greater on flat plains, but with less run-up height as the tsunami energy is dispersed over a larger area (Mori et al., 2011).

Regionally, Tamil Nadu consists of fluvial systems that drain eastward across a relatively low-relief coastal plain. Near the coast, where the 2004 tsunami inundation occurred, the geomorphology consists primarily of beaches, seaward beach ridges, swales and mud flats (Ramasamy et al., 2006a, Ramasamy et al., 2006b). The beaches are narrow, with a length of 100-300 m, and accompanying swales in most cases do not extend more than 200 m landward of the beach, except just south of the Cauvery River delta near Vedaranyam (Fig. 2), where there are several inland beach ridges formed as the delta prograded (Ramasamy et al., 2006b). The Cauvery River delta (~10.3-10.7°N)

contains a number of paleochannels dated 750-2300 years before present that may represent ancient conduits for transporting tsunami flow further inland (Ramasamy et al., 2006b). Although not near a plate boundary, the southeastern coast of India has experienced some neotectonic motion. Just south of Chennai at 12.8° N latitude an E-W cymatogenic arch is leading to ongoing upwarping and accompanying denudation (Ramasamy et al., 2006a). This arch has displaced rivers and thus, has shifted sedimentation; shifting rivers north of the arch further to the north, and shifting rivers south of the arch further to the south (Ramasamy et al., 2006a). This would suggest that paleo-channels near the arch may contain past evidence of tsunamis. In general, the southeastern coast of India has been emerging during the Holocene with some local exceptions, likely due to high volumes of fluvial sediment deposition (Mohapatra and Prasad, 1999). At Mamallapuram (12.62° N, Fig 2) for example, geomorphic features indicate that the existing backwater body lying west of the current beach/dune complex was part of the open ocean after the most recent glacio-eustatic rise in sea level, possibly occurring in the Holocene (Mohapatra and Prasad, 1999). The current beach/dune complex initiated as a bar at the Palar River mouth after stabilization of the most recent glacio-eustatic rise in sea level (Mohapatra and Prasad, 1999). The absolute dates of the timing of the most recent glacio-eustatic rise in sea level on the southeastern coast of India are not well constrained. However, there is some evidence of relatively rapid sea-level rise in this area in the early Holocene, with only minor changes in the past 7,000 years (Hashimi et al., 1995; Kale and Rajaguru, 1985; Pirazzoli, 1991; Camoin et al., 1997). In addition, morphological evolution of the coast indicates a higher sea level

around 6,000 years ago (Bruckner, 1989). Archeological data suggests that from the beginning of the Christian era until the 8th century, Mamallapuram was a flourishing port town (Ramaswami, 1989). Currently, the Shore Temple is at the coastline and represents part of that flourishing port town and is referred to by archeologists as part of the Shore Temple Complex (Fig. 3). The lack of archeological data for the location of the port suggests it may be submerged, and offshore bathymetry indicates that the Shore Temple Complex may extend eastward into the current Indian Ocean (Mohapatra and Prasad, 1999). These factors point toward a potential local relative sea-level rise during the past 1200 years. Although there is some debate about the archeological history, the coastal geomorphology does not indicate any obvious change in the shoreline during the past 1200 years (Mohapatra and Prasad, 1999).

Figure 3. Mamallapuram Shore Temple Complex. Note lack of a beach berm; photo taken at mid-tide.

The 2004 Indian Ocean Tsunami—Interactions with Geomorphology

While most of the beaches in the state of Tamil Nadu were at least partially inundated by the 2004 tsunami, landward geomorphic features were affected less significantly: Mudflats = 85%, swales = 61%, seaward beach ridges = 26% and landward beach ridges = 3% (Ramasamy et al., 2006a). These numbers indicate that roughly 39% of seaward beach ridges acted as maximum inundation barriers for the 2004 tsunami on the southeastern coast of India and 74% of landward beach ridges acted as maximum inundation barriers when present. Furthermore, the majority of mudflats and swales were affected by the 2004 tsunami. This information directs paleotsunami researchers towards areas of the coast where landward beach ridges are not present or where drainages allow the tsunami to bypass the landward beach ridges. It also suggests that paleo-swales and paleo-mudflats may be advantageous locations for preservation of paleotsunami deposits. The mouths of multiple rivers were blocked or partially blocked with sand bars as a result of the 2004 tsunami inundation. These rivers included the Kuvam River in Chennai, the Adyar River in Chennai, the Pallar River south of Mamallapuram, the Ponnaiyar River at Cuddalore, and the Gadilam river south of Cuddalore (Vaidyanadhan, 2005). These barriers were removed by subsequent river erosion within months of the event. Likewise, shoreline erosion was common in many countries but only acted as a short-term change on many coasts which recovered within months of the event (Choowong et al., 2007; Richmond et al., 2006). Waterways such as rivers and canals acted as propagating agents for the 2004 tsunami waves, allowing them to bypass barriers and inundate further inland than adjacent areas (Ramasamy et al., 2006a).

Earthquakes and Tsunamis in the Indian Ocean Basin

At many sites around the Indian Ocean basin, the initial 2004 tsunami wave was not the highest amplitude (Merrifield et al., 2005). For the waves to reach the southeastern coast of India in less than three hours they must have had an average velocity greater than 450 km/h. The southeastern coast of India was inundated by three waves arriving at five minute intervals (Srinivasalu et al., 2007), the second one being the highest amplitude (Chadha et al., 2005). The second and third waves surged over the southeastern Indian coast before the first wave completely retreated (Srinivasalu et al., 2007). Tide gauges measured the tsunami wave amplitude as high as 2.17 m near the rupture zone immediately following the earthquake, and open ocean heights were measured by satellite as 0.60 m two hours after the event (Merrifield et al., 2005). The tsunami waves reached heights of 1.5 m at the tide gauge near Chennai prior to striking the southeastern Indian coast (Titov et al., 2005). The great magnitude of the event reached tide gauge heights of 0.2 m in Australia and Antarctica and 0.1 m in Africa and South America, though no direct tsunami damage was recorded outside the Indian Ocean basin (Titov et al., 2005). Wave size, orientation and global propagation patterns of the 2004 tsunami, as measured by tide-gauges, satellite altimetry and model simulations, were mainly resolved by direction and intensity of the seismic source (Titov et al., 2005). Once outside of the Indian Ocean, mid-ocean ridges acted as topographic waveguides focusing and trapping tsunami energy along their path (Titov et al., 2005).

The style of motion along the Indo-Andaman plate boundary during the December 26th, 2004 earthquake was both convergent and strike-slip, which in the

northern Andaman Islands is driven by back-arc spreading (Bilham et al., 2005). Prior to the shallow 2004 megathrust, recent seismicity along this plate boundary has occurred at deeper depths further to the east: 1847 (M_w = >7.5), 1881 (M_w = 7.9), 1941 (M_w = 7.7) (Bilham et al., 2005). Subsidence during the 2004 event in the Nicobar Islands was measured as 1-4 m with accompanying uplift in the Andaman Islands of 1-2 m (Bilham et al., 2005). These measurements are concordant with a down-dip fault width of 150-180 km and a slip of 7-23 m (Bilham et al., 2005).

Before the 2004 event, GPS measurements in the Andaman Islands show a convergence rate of 14 mm/year signifying that large earthquakes with comparable slip to the 2004 earthquake are unlikely to occur more often than once every 1000 years (Bilham et al., 2005). However, the convergence rate near the epicenter of the 2004 earthquake was higher, which yields a recurrence interval as low as 400 years (Bilham et al., 2005).

The extent of damage caused by the 2004 Indian Ocean tsunami in far-field sites such as India, Sri Lanka and Somalia is without equal in the historical record (Bilham et al., 2005; Dominey-Howes, 2007; Kumar and Achyuthan, 2006), and as such, unanticipated. The 1881 M_w = 7.9 Car-Nicobar earthquake generated a tsunami with a maximum amplitude in Nagapattinam on the southeastern coast of India (10.76°N) of only 0.90 m, with no recorded damage (Okal and Synolakis, 2008). In an analysis of what types of Sumatra-Andaman ruptures can reproduce tsunamis, Okal and Synolakis (2008) modeled worst-case scenario tsunami-generating megathrust earthquakes and their potential impacts on far-field sites like India. Other than the 2004 rupture, only one worst-case scenario would have a catastrophic effect on the southeastern coast of India.

Thus, a tsunami that is capable of deposition on the southeastern coast of India would most likely result from the Sumatra-Andaman rupture zone of the 2004 event.

Thailand, Sumatra, the Andaman islands and Sri Lanka have records of paleotsunamis in the Indian Ocean basin (Jankaew et al., 2008; Monecke et al., 2008; Rajendran et al., 2007; Jackson et al., 2008; Rajendran et al., 2013). Thailand has a radiocarbon-dated tsunami-laid sand sheet 550-700 years old and Sumatra has a well-correlated radiocarbon dated tsunami-laid sand sheet that is 600 years old (Jankaew et al., 2008; Monecke et al., 2008). Another potential tsunami occurred around 1000 years ago based on radiocarbon evidence from a Sumatran sand sheet that exhibits tsunami-like sedimentary features (1000-1200 years old), as well as dead mangrove vegetation and peat layers radiocarbon dated 900-1000 years old in the Andaman Islands (Monecke et al., 2008; Rajendran et al., 2007).

Tsunamis reaching the southeastern Indian coast are rare. Tide gauges have measured four distinct tsunami events between 1881 and December 26th, 2004: 1881, 1883, 1907 and 1941 (Srinivasalu et al., 2007). However, no geologic evidence has been documented for these events in India, which are thus far only recorded in local history.

Tsunami Sedimentation

Recent tsunami research shows that tsunami sediments are difficult to characterize and exhibit significant spatial variation regionally and between sites (Dawson and Shi, 2000; Gelfenbaum and Jaffe, 2003; Goff et al., 2004; Richmond et al., 2006; Srinivasalu et al., 2007). In some cases, tsunami deposits have similar characteristics in different regions. For example, paleotsunami deposits in swales between beach ridges in Sumatra

and Thailand both show normal grading (Monecke et al, 2008; Jankaew et al., 2008). These local topographic lows, which produces normal grading due to decreased velocity after initial tsunami inundation, create areas of ponded water that, in this case, were relatively unaffected by subsequent tsunami backwash. This example agrees with literature that suggests antecedent topography is a major factor affecting tsunami sedimentation (Morton et al., 2007). Even in well studied areas such as Tohoku, Japan, the expected limit of tsunami inundation was underestimated as a result of a poor understanding of the extent of paleotsunami deposits (Mori et al., 2011; Sawai et al., 2012). The 2011 Tohoku event led to over 15,000 deaths in an area where extensive tsunami monitoring and countermeasures were in place to reduce inundation potential, highlighting the importance of accurate mapping and characterization of tsunami deposits.

Many sandy paleotsunami deposits around the world are relatively easy to recognize because they are interbedded with finer-grained, muddy sediments (lagoons, peat marshes), representing a sharp difference in depositional energy (Atwater, 1987; Monecke et al., 2008; Jankaew et al., 2008). However, much of India's southeastern coastal plain is composed of fine to medium sand, so defining distinctive sedimentary characteristics of tsunami deposits is integral to identifying a sandy paleotsunami deposit that is interbedded with sands deposited by other processes.

In this project, I compared the stratigraphy from the 2004 tsunami to that of the underlying layers at 24 sites along the southeastern coast of India (10.4-13° N. latitude). Mechanisms for sand transport along this stretch of coast include wind, tidal currents,

average and storm waves, cyclones, and rivers. As hurricanes and tsunami are both major events; there is potential for their sediment deposits to share similar physical characteristics. Although the differentiation of storm and tsunami deposits has been discussed generally (Dawson and Shi, 2000; Morton et al., 2007; Nanayama et al., 2003), more investigation is necessary to further distinguish between these two types of coastal deposits.

Tsunami and storm deposits are both generally characterized by sheets of sand (Dawson and Shi, 2000; Morton et al., 2007). In vertical stratigraphic sections, criteria that may be useful for differentiating tsunami and storm deposits include composition, textures, grading, types of stratification and number of lamina (Dawson and Shi, 2000; Goff et al., 2004; Morton et al., 2007; Nanayama et al., 2000). Mud rip-up clasts are common in tsunami deposits but rare in storm deposits because storms are longer events and the extended agitation disaggregates and diffuses the mud (Morton et al., 2007). Mud laminations might be present within and at the top of tsunami deposits, as a result of suspended-sediment transport followed by sufficient time between tsunami waves for silt and clay to settle out of suspension. In contrast, storm deposits tend to lack the inner mud laminations that result from the constant, fast, nearly unidirectional flow of tsunamis (Morton et al., 2007). Although inverse grading is common in storm deposits, it is atypical in tsunami deposits because inundation and backflow of tsunami waves tends to involve decelerating flow (Gelfenbaum and Jaffe, 2003; Morton et al., 2007). Both tsunami and storm deposits may be massive or have planar stratification. Sedimentary structures other than planar stratification such as foresets, backsets and climbing ripples

are also common in storm deposits due to the low flow depths, varying flow velocities and mainly bed-load transport characteristic of storms (Morton et al., 2007).

Regional-scale variation in tsunami sand characteristics can be extreme. There is no single set of diagnostic characteristics that can be applied universally. Some traits that do not consistently differentiate tsunami and storm deposits include sorting, occurrence and distribution of heavy minerals and character of the basal contact. Both storm and tsunami deposits can be well to poorly sorted, both may contain heavy-mineral lamina because the heavy minerals are source dependent, and basal contacts for storm and tsunami deposits are typically sharp and distinct (Morton et al., 2007). Conversely, some studies show that storm deposits are better sorted and lack the erosional boundary found in tsunami deposits (Goff et al., 2004; Nanayama et al., 2000).

Transect-scale characteristics of tsunami deposits that might be diagnostic include geometry, landscape conformity, deposit elevation, extent of inundation and sediment transport distances (Morton et al., 2007). These characteristics are dependent upon the geomorphology of the site. The geomorphic characteristics of tsunami deposits are strongly related to the sand availability, embayment type, nature of the coast, accommodation space and landward environmental conditions such as vegetation and topography (Goff et al., 2009). Interaction with local bathymetry and topography has a significant impact on sedimentary characteristics of deposits generated by tsunami and storm events and may account for some differences between regions. However, one example of a signature landform made by tsunami waves is a tsunami scour fan (Goff et al., 2009), which occurs when an oncoming tsunami wave cuts a breach into a dune ridge

and reworks the dune material to form a fan landward of the dune as a result of oncoming flow, or seaward of the dune as a result of backwash. These fans have been documented in Japan, Chile, Kamchatka, and New Zealand (Kitamura et al., 1961; Bourgeois and Reinhard, 1989; MacInnes et al., 2005; Goff et al., 2009). In India these fans had associated plunge pools just seaward of the tsunami scour fan. These plunge pools are an erosional remnant of the cut that the tsunami made in the beach ridge and represent a zone of no deposition by the inundation of the tsunami wave. Another consistent geomorphic signature of tsunamis is decimeter-scale hummocky topography primarily resulting from an erosional contact (Goff et al., 2004; Jaffe and Gelfenbaum, 2007; Goff et al., 2009).

Sedimentologically, tsunami deposits tend to be < 25 cm in thickness (Atwater, 1987; Dawson and Shi, 2000; Gelfenbaum and Jaffe, 2003; Morton et al., 2007; Richmond et al., 2006; Srinivasalu et al., 2007) and drape the preceeding topography with broad sheets. In contrast, some storm surge deposits are > 30 cm thick and form thick sand lenses in topographic low spots near the shoreline (Morton et al., 2007). The 1993 Hokkaido-nansei-oki tsunami and the 1959 Miyakojima typhoon, which both affected northern Japan, show distinct differences (Nanayama et al., 2000). The storm deposits displayed foreset bedding and better sorting than the tsunami deposits (Nanayama et al., 2000). It seems that the only traits that consistently differentiates tsunami deposits in different locales is their greater regional inundation distance which allow them to transport sediment further inland than most storm deposits, and the common presence of tsunami scour fans. This attribute allows deposition in some

unique, inland repositories that are removed from tidal influences and reworking from subsequent storm events.

It has been demonstrated that skewness and kurtosis have the potential to aid in identifying differences among beach, dune and eolian-flat deposits. In Texas, eolian flat deposits provided uniform mean grain size and very good sorting which was only slightly altered after deposition by dune or beach environments (Mason and Folk, 1958). The beach samples had near-symmetrical skewness and were mesokurtic (normally peaked), the dune samples were skewed toward fine particles and mesokurtic, the eolian-flat samples were fine—skewed and leptokurtic (excessively peaked); the differences in these sediments were recorded in only the tails of the grain size curves (Mason and Folk, 1958). It is plausible that the high-energy, low-energy contrast that occurs during tsunami sediment deposition would lead to predictable kurtosis measurements, and possibly aid in identifying tsunami deposits around the world.

December 26th, 2004 Tsunami Deposits Around the Indian Ocean Basin

Sediments from the 2004 tsunami that were deposited along the Malaysia-Thailand Peninsula commonly showed normal grading where topography allowed waning flow or inhibited backwash (Hawkes et al., 2007). Coarser, massive sand units and one inversely graded sequence represented high-energy uprush flow at other sites (Hawkes et al., 2007). Likewise, two studies in northern Sumatra found normal grading, inverse grading and massive units in the 2004 tsunami deposits (Monecke et al., 2008; Richmond et al., 2006) and one study of the 2004 tsunami deposits in Thailand found normal grading in beach swales (Jankaew et al., 2008). Depositional characteristics were

largely due to flow patterns that were directed by local topography and offshore bathymetry (Richmond et al., 2006). When grain size data could not distinguish tsunami sediment from the pre-tsunami sediment on the Malaysia-Thailand Peninsula, foraminiferal grouping could—either the foraminifera were not present in the pre-tsunami sand or the assemblage was markedly different in the tsunami sand (Hawkes et al., 2007). Overall, tsunami deposits in Sri Lanka, the Maldives and Indonesia were widespread, locally variable and thin with no significant geomorphological features being created (Richmond et al., 2006). In Thailand and Sumatra, detection of the 2004 tsunami deposits was good in the beach swales where soil is peaty or silty (Jankaew et al., 2008; Monecke et al., 2008), as well as on the sandy soils of the beach ridge crests (Jankaew et al., 2008).

Marine diatoms have been used as supportive evidence when identifying 2004 tsunami deposits (Jankaew et al., 2008; Monecke et al., 2008; Seralathan et al., 2006; Srinivasalu et al., 2007). The 2004 tsunami deposits in Thailand and Sumatra contain diatoms, but diatoms are rare in older tsunami-laid sand sheets because of the relatively high rate of silica dissolution (Kamatani, 1982) in the hot, wet tropical environments (Jankaew et al., 2008; Monecke et al., 2008).

December 26th, 2004 Tsunami Deposits in India

Identifying tsunami deposits in the stratigraphic record can be troublesome due to their proximity to active environments such as floodplains and beaches which reduces their preservation potential (Dawson and Stewart, 2007). Further complicating the identification of tsunami deposits in India is the impact of tropical cyclones (Patra et al.,

2000). These cause overwash events which produce sandy deposits that share many characteristics with tsunami deposits.

In addition to the damage caused by the 2004 Indian Ocean tsunami on the southeastern coast of India, it also wrapped around the southern tip of India and struck the southwestern coast with considerable force. Although this caused more than 200 deaths and about $1 million in damage (Prakash et al., 2005); tsunami sediments deposited on the southwestern coast of India have not yet been identified. Near Chennai, run-up ranged from 1-5 meters and inundation reached 300 meters (Prakash et al., 2005). On the Cauvery River delta in the south (10.7° N), all of these parameters are significantly greater: Inundation was as far as 840m, runup was as high as 8.89m, and maximum sand transport distance was as far as 430m (Peterson et al., 2005; Yeh et al., 2007).

The sediment on the southeastern coast of India is derived from 2.6 Ga exposed basement granulite known as the Southern Granulite Terrain (SGT) (Balasubrahmanyan, 2006). The heavy tropical weathering of the SGT has left quartz-rich sands on the southeastern coast of India ranging from ~9ºN to ~13.5ºN latitude (Balasubrahmanyan, 2006). The predominantly quartz sand consists of a number of colors including clear, rose and purple (Seralathan et al., 2006). Other minerals present on the beaches of Tamil Nadu include a colorless garnet, colorless kyanite and trace amounts of glaucophane, actinolite, tremolite, zircon, chlorite, tourmaline, biotite, ilmenite and magnetite (Seralathan et al., 2006). This quartz-rich sand represents the available sediment for transport during the 2004 Indian Ocean tsunami. Overall, the sand is medium-grained in

the northern part of the study area near Chennai. Moving southward, there is a distinct shift in mean grain size into the fine sand fraction as a result of encountering the Cauvery River delta which has transported sand further from the source rock relative to the northern sites (Ramasamy et al., 2006a).

CHAPTER III

METHODS

Field Methods

In February 2008, the 2004 tsunami deposits were described and sampled at previously documented sites (Srinivasalu et al., 2007; Srinivasalu, personal communication, 2008), as well as undescribed sites, to determine the maximum inland extent of recognizable stratigraphic layers at those locations (Fig. 2). Multiple sites that had no recognizable 2004 tsunami deposits were visited and documented for location and geomorphic context. Study sites were chosen based on geomorphic setting and documentation of previous inundation by tsunami. A handheld GPS unit was used with the WSG84 datum to measure latitude and longitude in decimal degrees at each sampling location.

Cores, auger holes and test pits were excavated at several locations within each site to determine the best sites to excavate trenches for more detailed stratigraphic descriptions. The typical pit orientation was parallel to the coast. Stratigraphy and sedimentary structures were described in the field for all deposits: color, density (loosely or tightly packed), grain size, roundness, unit thickness, grading, sedimentary structures, nature of the contacts between units, and relative moisture. The following characteristics were documented for presence or absence: mafic laminations, roots, anthropogenic artifacts, shells, clay rip-up clasts, tsunami debris such as tree limbs, depth to water table, organic boundary material, oxidation/reduction, flame and load cast structures, and bioturbation.

Sampling techniques were different for the northern and southern sites (Fig. 2). One pit at each northern site was designated for a more detailed stratigraphic description; this pit generally had the thickest recognizable tsunami deposit based on field observations. At these detailed pits, multiple samples were taken within the identified tsunami sediment at the smallest possible intervals (generally 2 cm), and along stratigraphic boundaries such as changes in color and grain size. These samples were retained for grain-size analysis in the laboratory to identify the mean, sorting, skewness and kurtosis of the sediment size distributions throughout each deposit. Multiple samples were also taken below the tsunami sediment units, when possible, to contrast the sedimentological statistics at each site. Other pits dug at the same site were described in equivalent detail but sampled more modestly, generally one sample within the tsunami deposit and one below the tsunami deposit to contrast the tsunami sediment from preexisting sediment units. At least 250 grams (estimated) of sediment was collected for each sample to ensure adequate sedimentary analysis and archive enough for reanalysis if necessary. In the southern sites, units were described in detail but sampled very modestly: one sample was taken within the tsunami deposit and one sample was taken below the tsunami deposit.

Landward beach ridges, which typically acted as maximum inundation barriers, were sampled at some sites to determine whether they contributed sediment to the 2004 tsunami deposits.

The 2004 tsunami sand was identified in the field by: 1) abrupt, hummocky lower boundary indicative of erosion, 2) mafic mineral laminations, 3) tan colored sand relative

to underlying oxidized sand, and 4) presence of organic material at lower boundary. Many deposits lacked mafic mineral laminations and were massive. There were also multiple deposits that lacked organic debris at the lower boundary. In order to be classified as distinct, the tsunami deposits needed to meet 1 and 2 or 1, 3 and 4, or all four criteria.

Study Sites

Srinivasalu et al.(2007) documented the sedimentary characteristics at multiple sites a few days after the 2004 tsunami (Sites 5, 6, and 7, Fig. 2). As part of this study, these sites were resampled and redescribed along similar transects in an effort to understand if and how the deposits had changed more than three years after the event. In general, these transects were described and sampled for stratigraphy in multiple pits at 50 m intervals, following the sampling pattern of Srinivasalu et al. (2007). In some cases, the erosive inland extent of the tsunami was more than 50 m from mean tide level, as determined from test pits, forcing the initial pit to be farther inland (for example: Mamallapuram pit 1 = 120 m). When tsunami stratigraphy was unclear, it was also necessary to increase the 50 m established interval (for example: Mamallapuram pit 1 = 120 m, Mamallapuram pit 2 = 200 m).

Additional sites in different geomorphic settings, for which there is no sedimentary data published, were also described and sampled in detail to characterize a greater breadth of geomorphic settings and gain better understanding of variation along the southeastern coast of India (Table 1). Using high-resolution Quick Bird satellite

TABLE 1. GEOMORPHIC SUMMARY

Site	*Location*	*Geomorphic Description*	*Geomorphic Category*	*Condition of Tsunami Deposit*
1. Pulicat Lagoon	13.40°N/80.31°E	Lagoon	4	None
2. Karikattakuppam	12.83°N/80.25°E	Behind short beach ridge	1	Distinct, tan sand over red clay
3. Muttukaddu	12.79°N/80.23°E	Lagoon	4	Distinct, tan laminated sand over grey clay
4. Kovalam	12.79°N/80.25°E	Beach swale behind short beach ridge--vegetated	1	Indistinct, some laminations
5. Thiruvadandhai†‡	12.75°N/80.25°E	Behind beach ridge, flat coastal plain with tsunami tsunami scour fan	2	Distinct, tan laminated sand over red sand
6. Vadanemelli†	12.73°N/80.24°E	Behind beach ridge, flat coastal plain with tsunami scour fan	2	Distinct, red laminated sand over grey sand
7. Mamallapuram†‡	12.61°N/80.20°E	Behind beach ridge, flat coastal plain with tsunami scour fan	1	Distinct, tan laminated sand over red sand
8. Aalikuppam	12.44°N/80.14	Beach swale near river confluence	3	Indistinct, presumably there
9. Cuddalore†	11.74°N/79.78°E	Overwash plain, vegetated near river confluence	3	Indistinct, tan sand over red sand
10. Tranquebar	11.02°N/79.85°E	Active coastal plain, near lagoon	4	Distinct, tan laminated sand over orange sand

TABLE 1 (CONTINUED)

Site	*Location*	*Geomorphic Description*	*Geomorphic Category*	*Condition of Tsunami Deposit*
11. Karaikal	10.92°N/79.85°E	Active coastal plain, no beach ridge	1	Distinct, tan laminated sand with rip-up-clasts over orange sand
12. Kallar	10.73°N/79.85°E	Inactive coastal overwash plain--above current overwash plain	2	Distinct, tan laminated sand over red silty sand
13. Vailanganni	10.68°N/79.85°E	Flat coastal plain--no beach ridge—near river confluence	3	Indistinct, deposit definitely there but difficult to constrain
14. Puthupalli	10.58°N/79.85°E	Coastal plain behind old beach ridge	1	Distinct, tan laminated sand over red sand
15. Vilundamavadi	10.53°N/79.85°E	Behind tall active beach ridge in forested area, with tsunami scour fan	2	Distinct, tan laminated sand over red sand
16. Pushpavanam	10.49°N/79.86°E	Inactive coastal overwash plain	1	Distinct, tan laminated sand over gray clay—large woody debris
17. Vedaranayam	10.37°N/79.83°E	Active coastal plain, no beach ridge, clay and sand--mudflat	1	Distinct, tan laminated sand with rip-up-clasts on top of gray clay

[†]Sites analyzed by Srinivasalu et al (2007), that were retraced in this study to document post-depositional change.
[‡] Sites where we studied a transect; tracing tsunami deposits from the mean tide level to their furthest inland extent.
Note: Dashed line between Aalikuppam and Cuddalore represents the separation of the northern sites and the southern sites.

imagery, provided by the USGS (post-tsunami imagery), as well as Google Earth satellite imagery (pre-tsunami imagery), these sites were chosen based on proximity to the coast, type of geomorphic environment, absence of anthropogenic influence, apparent tsunami inundation (sand sheets, shoreline changes, lack of vegetation) and accessibility.

Sedimentary Analysis

A total of 160 samples were collected in the field for sedimentological analysis. All samples were analyzed except for 1-4, and 67-70 (Mamallapuram samples that were not part of the final transect analyzed in this study) and 103 (confiscated at customs for containing roots). Grain-size analysis was conducted using a Malvern Mastersizer 2000 laser particle-size analyzer. This instrument is capable of producing results with total uncertainty of less than 6%, compared to sieve and pipette methods which may record error greater than 40% (Sperazza et al., 2004). The Mastersizer measures the average size of each grain in three dimensional space using water as a medium. In addition, conventional sieving was used at Mamallapuram to establish a comparison with the laser particle-size analyzer results because Srinivasalu et al., (2007) used the wet sieve method.

Each sample was prepared by splitting and sonication. Splitting was done by simple mixing and cutting into equal portions to reduce sample size without introducing sampling bias. Mixing was done by hand and the sediment was cut into equal portions, using a knife, into teaspoon-size portions adequate for Mastersizer analysis. In order to disaggregate grains, sediment samples were sonificated while the sediment was in the Mastersizer 2000. Without sonication, median grain size might be overestimated because of aggregated particles and/or clay coatings (Sperazza et al., 2004). Excessive sonication

might result in fracturing of primary grains and yield an underestimation of mean grain size (Sperazza et al., 2004). To reconcile these two end members, the duration used in this project was 60 seconds, which has been demonstrated as the ideal sonication time for the Mastersizer 2000 (Sperazza et al., 2004).

Every sediment sample has its own unique combination of optical laser properties due to the relative abundance and types of minerals. To resolve unknown optical properties of each sample it is necessary to test for the most reproducible results. In this study, most samples consisted of >90% quartz which allowed the use of uniform optical properties across all samples. The most reproducible index of refraction was 1.52, and the most reproducible absorption was 0.1. These properties make sense because quartz has been documented as having an index of refraction of 1.54 (Wenkh and Bulakh, 2004) and a completely transparent substance would yield an absorption of 0.0.

Machine parameters affecting grain size results include pump speed, stirrer speed and laser obscuration. The pump speed range of the Mastersizer 2000 is 0-2500 rpm to account for differences in particle size, density and sample reservoir volume. Fine-grained sediment has been documented to achieve the most stable results for pump speed between 1800 and 2300 rpm (Sperazza et al., 2004). This project utilized the higher range of this stability field (2100 rpm) to ensure particle entrainment, because the dominant grain size of most samples was medium sand. The stirrer speed range for the Mastersizer 2000 is 0-1000 rpm. The stirrer assists with particle entrainment in the sample bath. Should the stirrer be set too low, not all of the particles will entrain and circulate through the Mastersizer 2000; should the stirrer bet set too high, turbulence may

affect the outcome of grain size analysis. It was observed that all particles were entrained and stable results were recorded when the stirrer speed was set to 750 rpm. Laser obscuration is the percentage of light obscured by the suspended sample as it passes in front of the laser. While low values of 5-10% obscuration returned variable results, very high reproducibility was achieved with higher obscuration values of ~20%. Grain size results reported in this study were the average of three successive laser diffraction runs. The use of multiple runs allowed inspection for reliability of the results and reduction of error associated with machine parameters. Potential sources of error include: the introduction of air bubbles from the pump speed being too high, machine spikes or other mechanical problems. The precision of the three runs was very high for all samples (~1% variability) indicating the use of reproducible machine parameters.

The Malvern software calculates the percentage of grains at set micron intervals. To use standard grain size statistics, it was necessary to convert microns into phi units. To do this, the 95^{th}, 84^{th}, 75^{th}, 50^{th}, 25^{th}, 16^{th} and 5^{th} percentiles were transferred into a Microsoft Excel spreadsheet and calculated into Krumbein phi units (φ) using $-Log_2$. The phi units are a logarithmic scale defined by: $D= D_0 2^{-\varphi}$, where D is the diameter of a given particle and D_0 is a reference diameter equal to 1 mm. The finest sand is represented by 4.00 φ and the coarsest sand equals -1.00 φ. In the below equations, φ16 is the 16^{th} percentile grain size—i.e. 16% of the sample grains are larger. The mean, sorting, skewness and kurtosis of each sample were calculated after Prothero and Schwab (2004) as seen in equations 1, 2, 3 and 4 below:

Mean (1)

$$[\frac{(\varphi 16 + \varphi 50 + \varphi 84)}{3}],$$

Sorting (Std. Dev.) (2)

$$[\frac{(\varphi 84 - \varphi 16)}{4}] + [\frac{(\varphi 95 - \varphi 5)}{6.6}],$$

Skewness (3)

$$\left\{\frac{[(\varphi 84 + \varphi 16) - (2\varphi 50)]}{[2(\varphi 84 - \varphi 16)]}\right\} + \{\frac{[(\varphi 95 + \varphi 5) - (2\varphi 50)]}{[2(\varphi 95 - \varphi 5)]}\},$$

Kurtosis (4)

$$\{\frac{[(\varphi 95 - \varphi 5)]}{[2.44(\varphi 75 - \varphi 25)]}\}.$$

Representative samples from the most convincing tsunami deposits (Thiruvadandhai, Mamallapuram, Kallar) and some potential tsunami deposits that were difficult to identify in the field (Aalikuppam, Cuddalore) were observed using a binocular microscope. Documented characteristics included roundness, shape, grain surface textures, presence or absence of clay coatings, relative mineral content and presence or absence of microfauna. A petrographic microscope was used to search for presence or absence of diatoms. Samples were prepared for diatom analysis by splitting a teaspoon-sized sample into a centrifuge tube and filling it with water 2cm above the sediment level. The samples were put into the centrifuge at 3500rpm for 10 minutes and then decanted. The centrifuge/decant process was repeated, and then a small portion of the sample was smeared onto a thin-section slide for examination.

Optically Stimulated Luminescence Dating

Optically stimulated luminescence (OSL) dating is a method of measuring the time elapsed since sediment was last exposed to daylight (Murray and Wintle, 2000). Because tsunami deposits bury a large area in a very short period of time, OSL dating of sediments immediately underlying or within the tsunami deposit can result in accurate timing of tsunami events. To obtain an effective date with this method, the sediments being dated need to have been adequately exposed to daylight in their last years before burial. Exposure can be achieved through multiple processes including wind, tidal currents, waves and bioturbation. OSL dating has been shown to effectively date tsunami-laid sands when these conditions are met (Ely et al., 2010; Eipert, 2004; Huntley and Clague, 1996).

OSL samples were collected at ten different locations. These samples were chosen based on different observations at field sites such as relative soil development (goal was to test older samples so we searched for well-developed soils), type of geomorphic environment, least disturbed sediment, preservation of the 2004 tsunami deposit and latitudinal location along the coast. All samples were taken from sediments underlying the 2004 tsunami deposits. Sites and sampling depth were chosen based on: high level of preservation of 2004 tsunami deposits, minimal bioturbation or oxidation, and representation of a variety of geomorphic settings. Sampling was done as recommended by the Utah State University OSL lab: 1) 1.5" x 8" metal tubes were gently hammered into the pit, at the desired depth, until the tube was completely full and packed tightly, 2) film canisters were filled with nearby sediments to test for moisture content, 3)

a 1-quart zip lock bag was filled halfway with sediments surrounding the metal tube for environmental dose rate analysis, 4) the tube was carefully extracted and the ends were packed with extra sediment before being capped and taped shut. Detailed descriptions were sent in with the OSL samples which included: depth, latitude, longitude, elevation and detailed sedimentary and stratigraphic characteristics.

CHAPTER IV

RESULTS AND DISCUSSION

Geomorphology

One of the objectives of this study was to categorize tsunami deposit characteristics based on their general geomorphic setting. Based on field observations, five major geomorphic settings that preserved the 2004 tsunami deposits on the southeastern coast of India were described and sampled in this study (Table 1):

1. Coastal plain landward of a gradually sloping beach with little to no seaward beach ridge (Figure 4).
2. Breached coastal beach ridges (Figure 5). These sites were breached in places by the 2004 tsunami, which took the path of least resistance and cut channels into the pre-existing topographic lows of the beach dunes. These breaches have been referred to as tsunami scour fans (Kitamura et al., 1961; Bourgeois and Reinhart, 1989; MacInnes et al., 2005; Goff et al., 2009). In our study area, these fans were built on the landward side of the scour as a result of inflow. In a 15 km north-south coastal section located south of Chennai, the 2004 event created 20 of these breaches. This study analyzed three of these in detail: Thiruvadandhai, Vadanemelli and Mamallapuram (Fig. 2, Table 1).
3. River floodplains (Figure 6).
4. Tidal lagoons and associated barriers (Figure 7).
5. Miscellaneous anthropogenic sites such as archaeological locations and canals.

Figure 4. Geomorphic Category 1 at Mamallapuram. This type of beach setting had well-preserved tsunami deposits.

Figure 5. Geomorphic Category 2 at Thiruvadandhai. Dune and accompanying tsunami scour fan, with plunge pool (looking seaward).

Figure 6. Geomorphic Category 3 at Aalikuppam. The inset image (Google Earth) delineates photo location (view to south at star) and orientation of transect (arrow) taken at this study site. Indian Ocean is to the east.

Figure 7. Geomorphic Category 4 at Muttukaddu. A distinct sand layer in the lagoon sediments where the photo was taken (view to north at star on inset Google Earth satellite image) was probably deposited by the 2004 tsunami. The tsunami likely traveled through the inlet north of the photograph location to deliver its sediment load.

Further satellite imagery of the geomorphology of the study sites can be found in Appendix C, Figures C1, C2 and C3.

Table 1 shows all the sample sites and their corresponding geomorphology and describes the relative preservation potential of tsunami deposits at each geomorphic site. The overlying tsunami deposits are most often differentiated by the presence of mafic mineral laminations and a light tan color, while the underlying units were oxidized red and usually massive (lacking stratification). In some cases the underlying units were also laminated and there was a zone of red and gray mottling suggesting oxidation and reduction, potentially from a fluctuating water table.

The following section contains descriptions of the geomorphic characteristics of the sites listed in Table 1. The descriptions are ordered by latitude, from north to south and separated into the northern group and southern group (Fig. 2). The differentiation in the grouping is primarily attributed to a distinct grain size shift. In addition, the northern sites generally had a more established seaward beach ridge, and the tsunami waves had lower overall inundation distance inland and lower runup heights relative to the southern sites (Peterson et al., 2005). An example stratigraphic column and accompanying photograph are shown below (Figures 8, 9). Refer to the following appendices for detailed data from each site: Appendix A = stratigraphic descriptions and stratigraphic columns; Appendix B = grain size data; Appendix C = photographs of the study sites and individual pits; and Appendix D = raw data from the laser particle-size analysis.

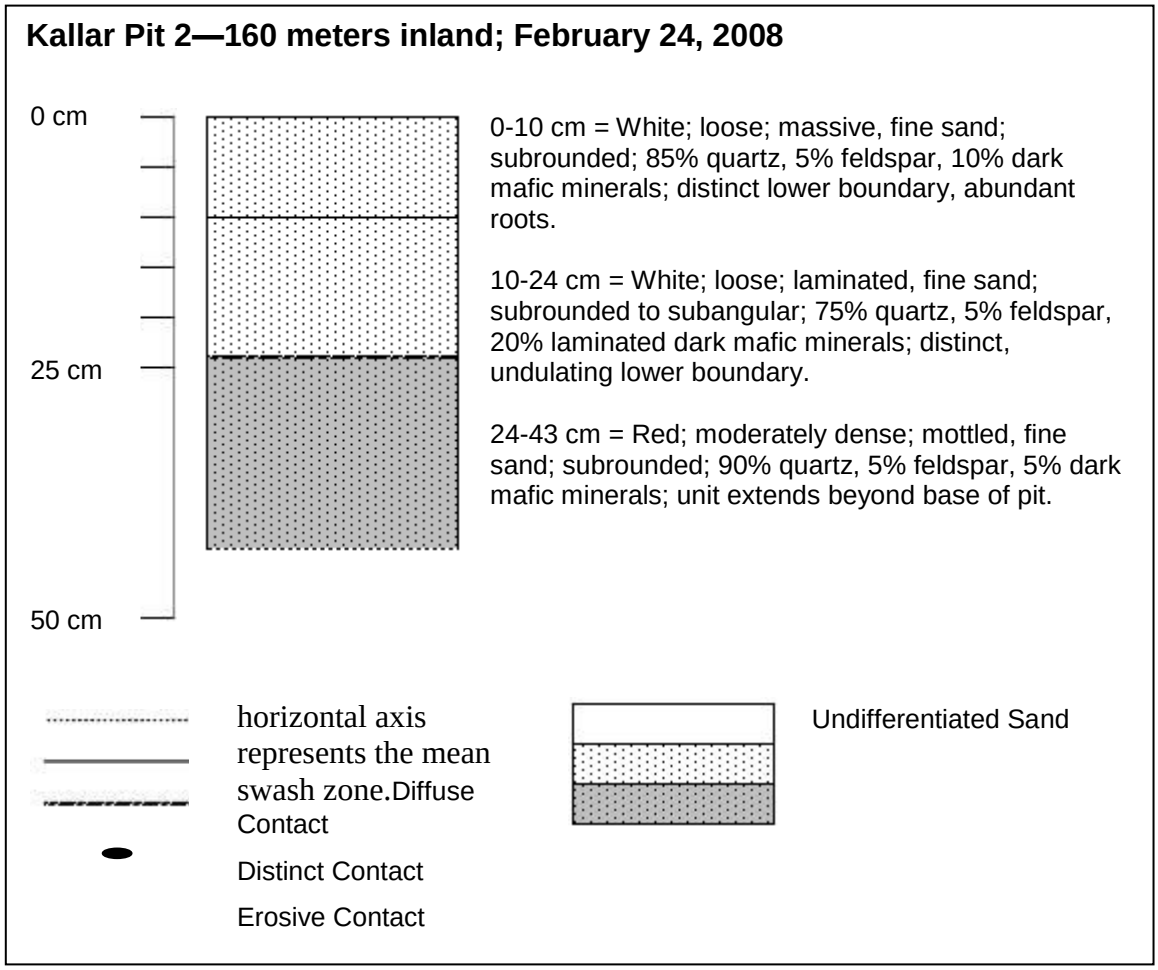

Figure 8. Stratigraphic column and description of Kallar Pit 2.

Figure 9. Photograph of Kallar Pit 2.

Geomorphic Descriptions of Northern Study Sites

Pulicat Lagoon fits into geomorphic category 4 and is characterized by a large, shallow lagoon that is separated by a barrier from the Bay of Bengal (Fig. 2). Pulicat Lagoon is the northernmost site in this study, straddling the border of the state of Tamil Nadu to the south and the state of Andhra Pradesh to the north. The lagoon is up to 18.5 km by 60 km in area. The average depth of the lagoon is about 1 meter. The coastal barrier dune ranges between 0.5 km and 2.5 km wide. The sandy islands Irkam and Venad are aligned north to south in the northern part of the lagoon, effectively dividing it into distinct east and west sections. These islands rise only a few meters above the active lagoon, and are composed of tan, medium-sized sand. Witnesses recount that the 2004 tsunami inundated the entire lagoon and formed a sandy barrier over the inlet, which was quickly removed by tidal processes. Trenches were dug on the sandy barrier islands and on the coastal dunes on the landward shore at Pulicat Lagoon, however they revealed only homogenous, massive tan sand. Tsunami deposits were not identified at this site.

Karikattakuppam is a small town located at 12.83º N. This town is on a beach ridge within meters horizontally and vertically of the active beach and was abandoned shortly after the tsunami inundated and destroyed most of the homes there. There is a very narrow beach ridge that the tsunami overtopped, placing this site in geomorphic category 1. The tsunami was funneled between two man-made walls and traveled at least 300 meters inland, tearing off the kitchen wall of a house as it passed (Fig. C4). A distinct tan sand layer overlying preexisting hard red clay represents the likely 2004

tsunami deposit (Fig. C5). Local residents said that this clay was used for agricultural purposes before the tsunami struck.

Muttukaddu is located at 12.79º N. This site is a lagoon separated from the coast by a barrier and is about 1.5 km inland from the active beach zone, fitting into geomorphic category 4. This lagoon is about 0.5 km wide and greater than 20 km in length (north to south along the coastline). This site is unique in that the tsunami was able to reach much

further inland, using the lower resistance of the lagoon as a means of propagation. Digging pits on a mudflat adjacent to the lagoon water we sampled from a spot 1.5 km inland from the Indian Ocean and encountered a distinct sand layer, probably deposited by the 2004 tsunami (Fig. C6). The preservation potential in a lagoon setting such as Muttukaddu is primarily dependent on sea-level fluctuation. The long distance inland to this site also helps to remove this location from waves and tides that might affect sites in geomorphic categories 1, 2 and 3.

Kovalam is a town located at 12.79ºN. This area has a small, indistinct beach berm that the tsunami passed over on the way into the town. This site fits into geomorphic category 1. The beach has a distinct rocky point and small cove just north of it. Locals account that the cove and accompanying rocky point were not exposed prior to the tsunami, but were a result of tsunami erosion of sand. Prior to the event this area had a relatively straight section of beach. We sampled a small beach swale that local residents said contained standing water after the tsunami struck. This swale has a distinct

sand deposit underlain by a organic-rich zone 15 cm down from the surface, which represents the pre-tsunami surface vegetation (Figure A14).

The Thiruvadandhai site, located at 12.75º N has a high seaward beach ridge that rises about 6 meters above the active tidal zone. The 2004 event left a distinct breach in the seaward beach ridge, and just landward of the breach is a tsunami scour fan (Fig. C7) created by the tsunami, placing this site in geomorphic category 2. Landward of the coastal dune is a flat plain that extends 300 meters inland until it encounters the paleobeach dune that rises about 10 meters above the flat plain. The thickness of the presumed tsunami sand layer at the top of the sections at this site was highly variable over a short lateral distance, and represented some of the thickest deposits identified at our northern sites, reaching a thickness of 32 cm (Fig. C8). Because of the thickness and distinctness of the candidate tsunami deposits at this location, Thiruvadandhai is a site that we sampled in greater detail, completing a transect that extended from the tidal zone to the distal extent of these deposits at 300 meters inland.

Vadanemelli is located at 12.73º N. The general geomorphology mirrors Thiruvadandhai, having a high seaward beach ridge that rises about 6 meters above the active tidal zone. This dune was breached and has an accompanying tsunami scour fan (Figure C9), placing this site into geomorphic category 2. Landward of the coastal dune is a flat plain that extends approximately 350 meters inland until it encounters the paleobeach dune that rises about 10 meters above the flat plain. A distinct tan sand overlies red sand at this location, indicative of the probably 2004 tsunami deposit. There was also a clear organic layer delineating the lower boundary of the deposits and

representing the pre-existing surface vegetation. The scour fan at this location was somewhat smaller compared to the plunge pool at Thiruvadandhai.

Mamallapuram is located at 12.61º N (Figures 10, 11). This site has a relatively short seaward beach ridge (< 2 meters) that was breached by the tsunami and left an accompanying tsunami scour fan and plunge pool (geomorphic category 1). The flat plain landward of the seaward beach ridge extends 600 meters inland until it reaches a second, landward beach ridge that rises about 6 meters above the flat plain. We were able to trace a surface sand layer, interpreted as the 2004 tsunami deposit, 600 meters inland at this location until it pinched out against the landward beach ridge (Fig. C10). We completed a detailed transect at Mamallapuram in an attempt to statistically differentiate the tsunami sand and determine whether and how the deposits vary with distance inland.

Aalikuppam (12.44º N) is located along the Palar River floodplain, placing this site into geomorphic category 3 (Figures 6, C11). The Palar River is up to 100 meters wide within 100 meters of the Bay of Bengal, but narrows to just 10 meters across as it encounters the Bay of Bengal. Local residents stated that the tsunami traveled 7 km upstream, adjacent fields had standing water in them for 3 months after the 2004 tsunami struck and that the mouth of the river was temporarily blocked by sand, which allowed muddy water and sand to remain in the stream channel for weeks before the sand plug was eroded away. Upon arrival at the site in February, 2008 the mouth of the river was unblocked and the river flowed freely to the ocean. There is a series of three coastal beach ridges with accompanying swales located on the north bank of the Palar River.

The swales between the ridges had still-water marks on them in the form of flotsam (Figure C4). We took sediment samples from each swale. On the south side of the river, we dug a trench into a well-formed terrace that was only a couple of meters above the active river. This trench showed a distinct sand layer with a clear lower boundary (Figures A24, C12). We noted abundant, thin mafic mineral laminations at the seaward beach ridge at this location, but very few mafic minerals or laminations in the tsunami deposits inland of that location (Fig. C13).

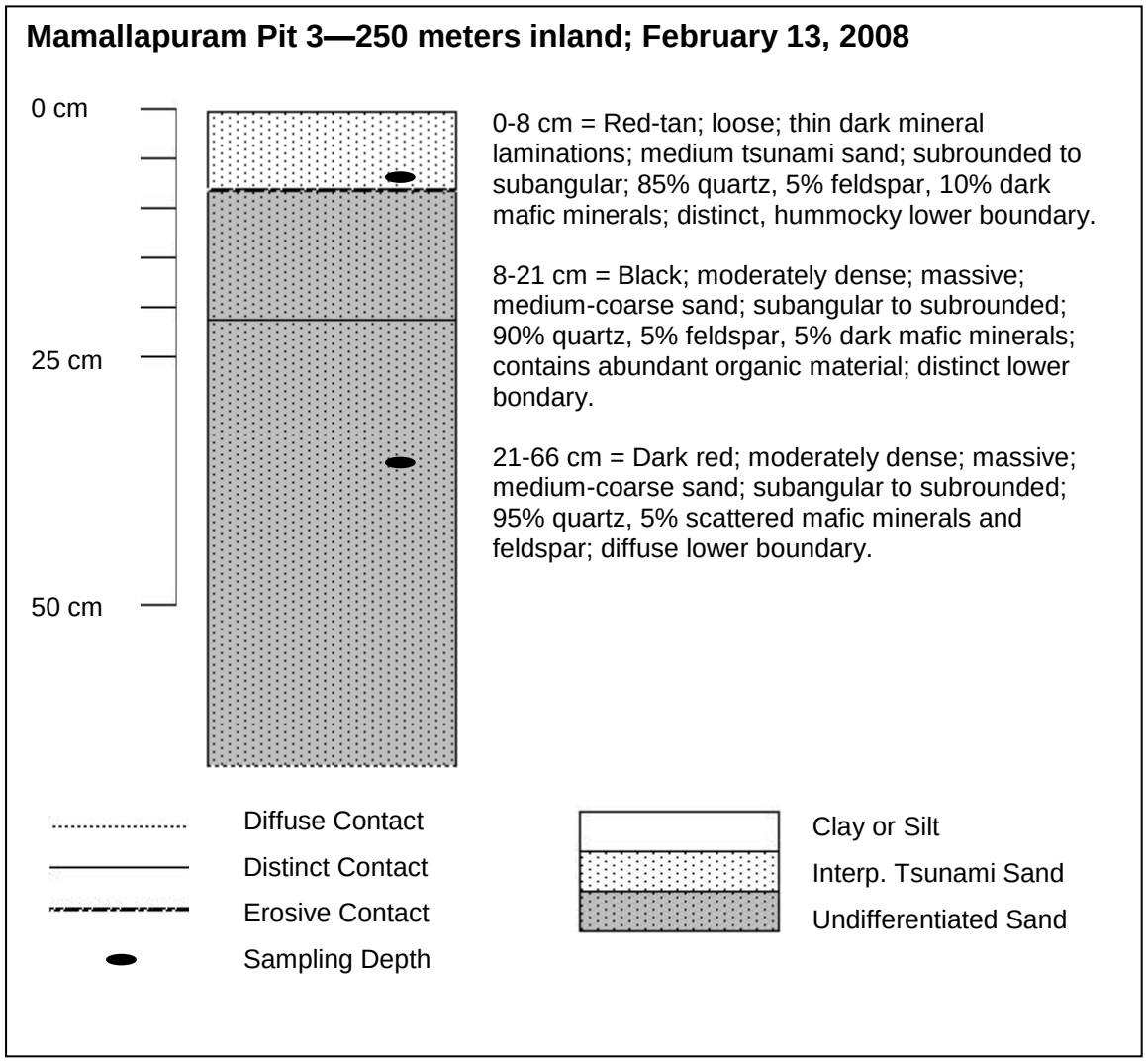

Figure 10. Stratigraphic column and description of Mamallapuram Pit 3

Figure 11. Photograph of Mamallapuram Pit 3. Trowel is placed at the contact between the interpreted tsunami sand and the preexisting sand.

Geomorphic Descriptions of Southern Study Sites

Cuddalore is located at 11.74º N and represents the approximate midpoint of all sites analyzed in this study. This site is the northernmost representation of a distinct grain size change observed at the southern sites in this study. All sites south of and including Cuddalore had markedly finer grain sizes than the northern sites. Silver Beach at Cuddalore is a popular tourist and recreational destination located just north of the mouth of the Gadilam River, fitting this site into geomorphic category 3. There was a distinct, heavily vegetated river terrace near the town of Cuddalore with a preserved sand layer interpreted to be the 2004 tsunami deposit, in the form of dark tan sand with a distinct lower contact overlying preexisting gray sand (Fig. A25). There were abundant roots in the massive sand layer and minimal mafic minerals.

Tranquebar is located at 11.02º N. This area of beach has been eroding recently, evidenced by a near vertical scarp in the seaward beach ridge, which is being actively eroded by waves and tides. We dug a pit in a small lagoon that was about 100 meters landward from the mean swash zone separated by a barrier (Geomorphic Category 4). There was a distinct sand layer interpreted to be the 2004 tsunami deposit at Tranquebar, but it was not possible to trace the deposit inland at this location. The massive sand layer had abundant roots and was light tan with clay rip-up clasts and a diffuse lower contact overlying a heavily oxidized sandy clay.

Karaikal is located at 10.91º N. This area has a wide, low lying beach with little to no seaward beach ridge, placing it into geomorphic category 1. Pit 1 at this location had a light tan sand at the surface with thin, abundant mafic mineral laminations.

Between 15 and 20 centimeters depth there was a distinct clay unit (Fig. C14). The clay was likely ripped up and deposited by the 2004 tsunami as it overlies an organic-rich layer interpreted to be the preexisting surface vegetation. The interpreted 2004 tsunami deposit has a hummocky lower boundary, overlying a mottled gray and red laminated sand. Though the interpreted tsunami deposits are distinct, the long-term preservation potential in this area is questionable due to the close proximity to the water table (oxidation and reduction) and swash zone (reworking).

Kallar is located at 10.73º N. This location is on a flat coastal plain with a mid Holocene beach ridge located about 500 meters inland of the current active beach. This site falls into geomorphic category 1, because of no discernible near-shore beach ridge. At this location we focused on trenching behind the landward beach ridges that might have offered protection from past storm or tsunami surges, thus increasing preservation potential. This location preserved a very distinct tan, laminated sand, interpreted as the 2004 tsunami deposit. It overlies a red massive sand (Figures 8 and 9) with an abrupt contact between them indicative of an erosional boundary. This area is actively farmed, so even though some areas have remained unfarmed since the 2004 event, it is possible that out sampling site will be farmed again, thus disturbing or destroying sedimentary evidence of the 2004 tsunami.

Vailanganni is located at 10.68º N. The Vellayar River enters the Bay of Bengal just south of the city (geomorphic category 3). The town is located on a small section of what is a large coastal plain, extending multiple kilometers inland. One well-formed river terrace above the current floodplain offers a potential to preserve the 2004 tsunami

deposits, because it is removed from waves, tides and active fluvial processes. We dug three different pits at Vailanganni and each one was different. The tsunami deposits were not easy to decipher, and the heavy mottling from the fluctuating water table potentially masked the true tsunami boundary (Fig. C15). Each pit had a different stratigraphic signature and there were no definitive tsunami boundaries. Pit 1 had an organic zone between 71 and 79 centimeters, which was the most likely lower boundary of the tsunami deposit in that location (Figure A24). Pit 2 had tan sand as deep as 84 centimeters, indicating the most likely depth of the tsunami deposit (Figure A25). Pit 3 had laminations between 50 and 58 centimeters and a diffuse hummocky lower boundary indicating a possible lower boundary of the tsunami deposit at 58 cm (Figure A26). Sand above the laminations was heavily mottled and dark red in most places. All of these pits were within 100 meters of each other. The great variation in the thickness of the tsunami deposit candidates adds to the uncertainty of the identification of tsunami deposits at this location.

Puthupalli, located at 10.58^{o} N, has a small seaward beach ridge and manmade canal that runs within a couple hundred meters of the active tidal zone, placing this site into geomorphic category 1. About 500 meters from the coast, the swale behind a landward beach ridge provides a potential repository for the 2004 event. We dug a trench in the swale about 20 meters west (landward) of this beach ridge and found a distinct candidate for the 2004 tsunami deposit, consisting of tan, laminated sand over red, slightly silty sand. If human influence has not altered this site, it could have good

potential to preserve the 2004 tsunami deposits, because it is removed from waves and tides.

Vilundamavadi is located at 10.54º N. This site has a relatively large seaward beach ridge that is about 10 meters high. The tsunami was able to erode this ridge and deposit within an agricultural field. One pit we dug here was on a scour fan landward of a plunge pool that was within a few meters of the seaward beach ridge. This scour fan is reminiscent of the plunge pools we found in the northern study sites and represents the only site in Geomorphic Category 2 that we documented in the southern sites. This is also the only geomorphic environment that mirrors the tall coastal beach ridges at the northern sites where these plunge pools were found. Just as in the northern sites, this scour fan exists landward of the beach ridge, making it a result of inundation. This site contained a distinct, tan, laminated sand with an abrupt lower boundary overlying red sand, indicative of a tsunami deposit with an erosive base (Figure A39, A40).

We also sampled a Holocene coastal dune at this location. The ridge's preservation was aided by the stabilizing effect of palm tree roots. We took an OSL sample at the base of the ridge to gain a better understanding of the relative stability of the coastline in the southern part of the study area. An old OSL age might indicate an eroding shoreline while a young one may indicate rapid deposition and progradation. A prograding shoreline provides a better potential repository for paleotsunami deposits because subsequent deposition would bury and preserve the tsunami deposit in a position landward of active waves and tides.

Pushpavanam, located at 10.49º N, has a relatively topographically low seaward beach ridge with a long, wide overwash plain, fitting this site into geomorphic category 1. Local residents stated that the 2004 event traveled about 1 km inland over this broad, low-lying coastal plain. Since then, farmers have planted casuarina trees that have reworked and disturbed many of the deposits in this area. Outside of the casuarinas grove there was a distinct tan, laminated sand over a reduced gray clay (Figure A22) that we interpreted as the 2004 tsunami deposit.

Vedaranyam is located at 10.37º N. This active coastal plain had no distinguishable seaward beach ridge (geomorphic category 1) and contained a mudflat which was a few centimeters lower than the adjacent beach sands. We dug a pit within the mudflat and found a distinct tan sand deposit overlying clay deposits. This mudflat was the only site in the study that had obvious deposition after the presumed 2004 tsunami deposit in the form of gray clay overlying the tan sand layer (Figure C16). It is expected that the clay deposition on top of the tsunami deposits could act as a buffer and waves and tides and provide a better chance of preservation and future identification.

Stratigraphic Thickness

The measurements of the thickest interpreted tsunami deposits at the northern sites were somewhat less on average than for the tsunami deposits at the southern sites (Fig. 12, Fig. 13). The average thickness of the thickest deposits (n = 8) we trenched at each site in the north was 15 cm and the average thickness of the thickest deposits (n = 9) we trenched at each site in the south was 32 cm. Even with the 79-cm-thick outlier at Vailanganni removed, the thickness of the deposits in the southern sites still averaged 24

cm. Cuddalore (11.74°N) is the northernmost of the southern sites, for purposes of this analysis. It is interesting to note that the tsunami scour fan sites (geomorphic category 2) included northern sites Mamallapuram (32 cm thick, 12.62°N; Fig. 12) and Thiruvadandhai (32 cm thick, 12.75°N; Fig. 13), as well as southern site Vilundamavadi (28 cm thick, 10.54°N), which all had similar thicknesses. These represent some of the thickest deposits we found. Vadanemelli was another scour fan site, but had significantly different results (9 cm thick, 12.73°N). This is largely because the pit we sampled at Vadanemelli was not taken along a transect (as was the case for Mamallapuram, and Thiruvadandhai) and was dug closer to the tsunami plunge pool. The data at Mamallapuram and Thiruvadandhai leads us to expect the deposit at Vadanemelli is thicker landward of the pit we analyzed in this study. It is important to note that, where present, the terminal topographic barriers to tsunami inundation in many of our study sites were landward beach ridges. There were also multiple locations in the southern sites that did not have recognizable terminal barriers, and no transects were analyzed to trace the tsunami sediments to their landward extent.

We did not investigate the differences in the bathymetry of the shoreline or sediment sources between the northern and southern sites, but both could affect tsunami deposit thickness. We did document a difference in thickness related to geomorphic

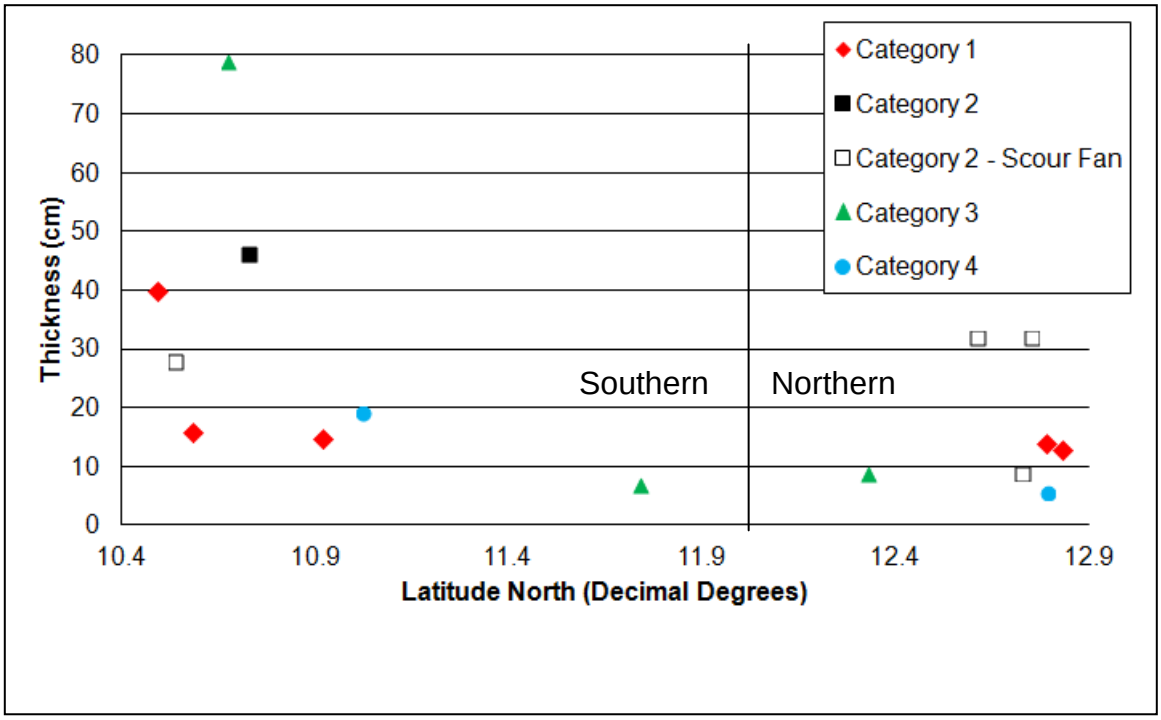

Figure 12. Interpreted tsunami deposit thickness variation versus latitude. This figure is plotted by geomorphic category. The thickest deposits from each sample site are plotted. Note that tsunami scour fan thicknesses (Category 2) are plotted separately.

settings and inundation distance (Table 1). In the northern sites, shorter inundation distances were related to 1) relatively taller (over 2 meters) beach ridges; and 2) terminal barriers that were closer to the shoreline. This geomorphic configuration blocked the tsunami, resulting in shorter inundation distances (Fig. 13). Two examples of near-shore barriers were the seaward beach ridges at Thiruvadandhai and Mamallapuram which had two of the thickest deposits in the northern sites. They were both located behind seaward beach ridges that yielded tsunami scour fans. In contrast, barriers to tsunami inundation were rare in the southern sites. Inundation distance and run-up height were greater in the

southern sites (Fig. 2) which allowed us to document tsunami deposits further inland, and overall thicknesses were greater (Fig. 13).

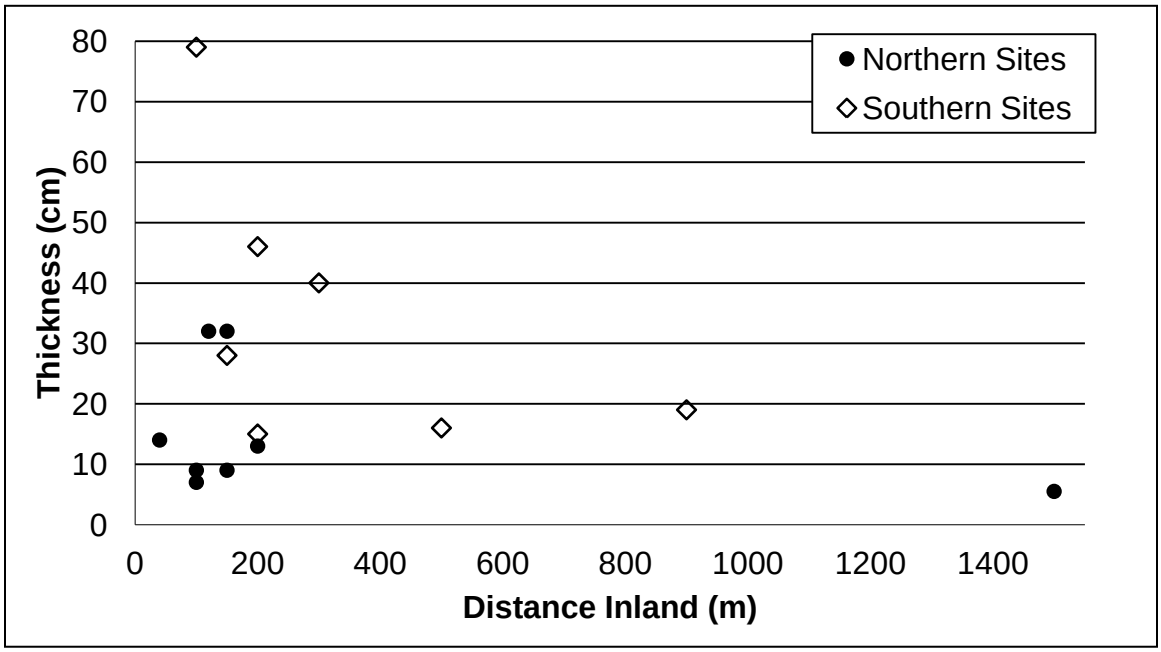

Figure 13. Maximum thickness of interpreted tsunami deposit vs. distance inland.

Transect Profiles of Tsunami Sediment Thickness

We measured sediment thickness along transects at Mamallapuram, Thiruvadandhai, Aalikuppam and Karikattakuppam, which were all in the northern group. The tsunami deposits at Mamallapuram were recognizable based on their mafic mineral laminations, erosive, hummocky lower boundary, relative lack of soil development, light tan color relative to underlying structureless red sand and traceable extent inland and laterally along the coastal plain. Mamallapuram had a short (less than 2 meter) beach ridge with a landward coastal plain and Thiruvadandhai had a relatively taller (> 2 meters) beach ridge in front of a coastal plain (Table 1, Fig. 4, 5, 16, 17). Aalikuppam was located at the confluence of the Palar River with the Bay of Bengal (Fig.

16, C11). Karikattakuppam was located behind a short beach berm on a well vegetated, flat coastal plain (Fig. 17, C4). Although Mamallapuram had a tsunami scour fan, the first pit in our transect was landward of the feature. Figure 14 shows the rapid decrease in deposit thickness with distance inland at Mamallapuram. A similar pattern was observed at Thiruvadandhai (Fig. 15) beginning with Pit #3. Pits #1 and #2 were seaward of the tsunami scour fan so we would not expect to find thick deposits at these locations.

The tsunami deposits at Thiruvadandhai were recognizable based on their mafic mineral laminations, erosive, hummocky lower boundary, relative lack of soil development, light tan color relative to underlying structureless red sand and traceable extent inland and laterally along the coastal plain. The change in thickness (thinner deposits at 50 m and 100 m vs 150 m) at Thiruvadandhai (Fig. 15) indicates that the zone of maximum erosion at this geomorphic setting is at the leading edge of the tsunami scour fan. Likewise, the thickness change with inland distance at Mamallauram and Thiruvadandhai indicate the zone of maximum deposition is landward of the tsunami scour fan location. The tsunami was able to carry recognizable sand 200 meters further inland at Mamallapuram. This difference was largely because of a lower elevation seaward beach ridge coupled with a landward beach ridge located around 520 m inland, which represented the terminal barrier to tsunami inundation. At Thiruvadandhai the higher elevation seaward beach ridge coupled with a landward dune that was only 300 meters inland resulted in lesser overall inundation values.

There is no correlation between deposit thickness and inundation distance in the northern study sites (Fig. 13). The thickness of tsunami deposits along the transect at

Aalikuppam was variable, indicating that there was also no correlation of tsunami sediment thickness at this site. The Palar River produced a substantial variations in tsunami wave dynamics, allowing it to inundate further inland than at other locations and concentrate flow into dune troughs. The only mafic mineral laminations we noted at Aalikuppam were in the pit 100 meters landward of the shore (Pit 4, Fig. A24). All other tsunami deposits were identified based primarily on sand color, an erosional lower boundary and lack of soil development. However, there were many mafic mineral laminations documented at the beach berm (Fig. C13). Thus, it is presumed that the tsunami inundation picked up additional river sediment that was deposited at the 150 meter and 200 meter locations.

The thickness profile at Karikattakuppam showed a direct, negative correlation with inundation distance until 200 meters (Fig. 18). Although no distinct change in topography was noted, the thickening at the most landward Pit #4 at 250 m could be due to local flow variation or small-scale topographic changes. This location was heavily vegetated, but tsunami wave energy was sufficient to remove the walls of nearby buildings (Fig. C4). This location had a distinct tsunami deposit of tan laminated sand erosively overlying a dark, organic-rich sand; the two units were separated by a sharp irregular contact. There has been heavy vegetation growth on the tsunami sand deposits where we sampled. We noted that roots had destroyed the near-surface sediment structures and increased the rate of soil development, but they had not yet altered tsunami laminations >8cm from the surface (Fig. C5).

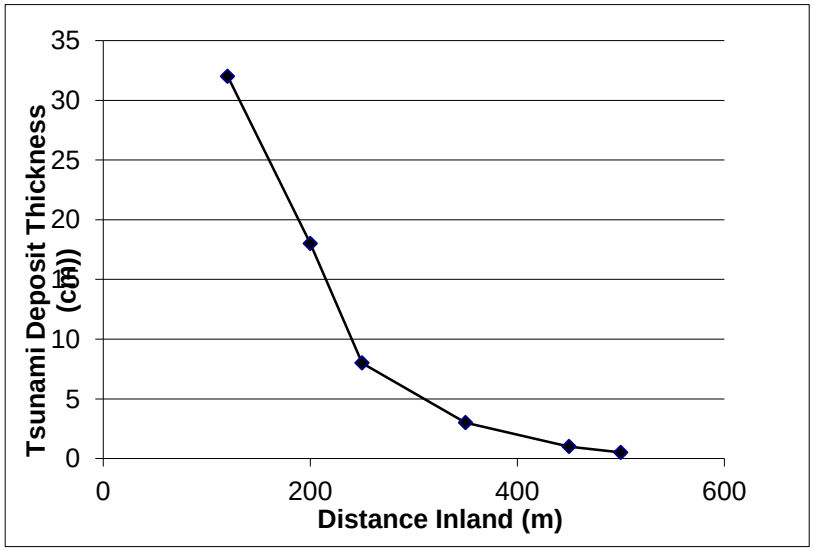

Figure 14. Interpreted tsunami thickness at Mamallapuram transect. The candidate tsunami deposit was measured at locations along the Mamallapuram transect. Zero distance inland represents the mean swash zone. Transect taken landward of a plunge pool within a tsunami scour fan.

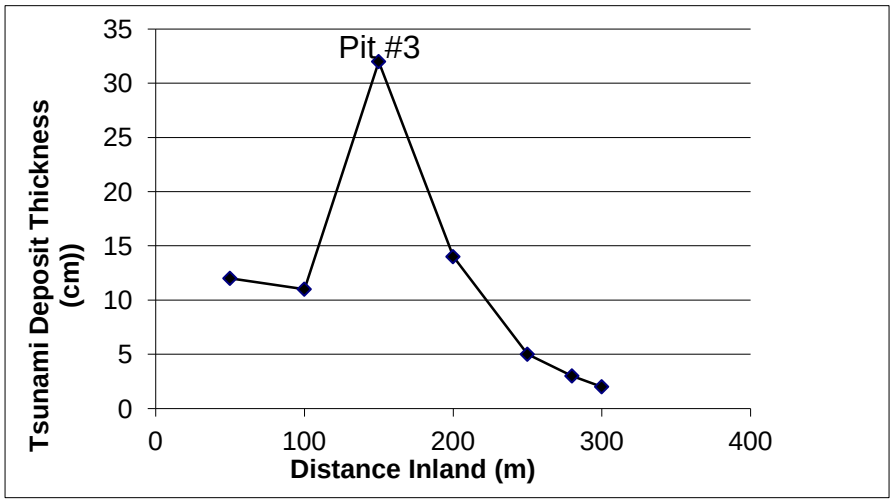

Figure 15. Interpreted tsunami thickness at Thiruvadandhai transect. The candidate tsunami deposit was measured at locations along the Thiruvadandhai transect. Zero distance inland represents the mean swash zone. Tsunami scour fan deposition starts at 150 meters inland at Pit #3. See Figure 22 for detailed Pit #3 grain size statistics.

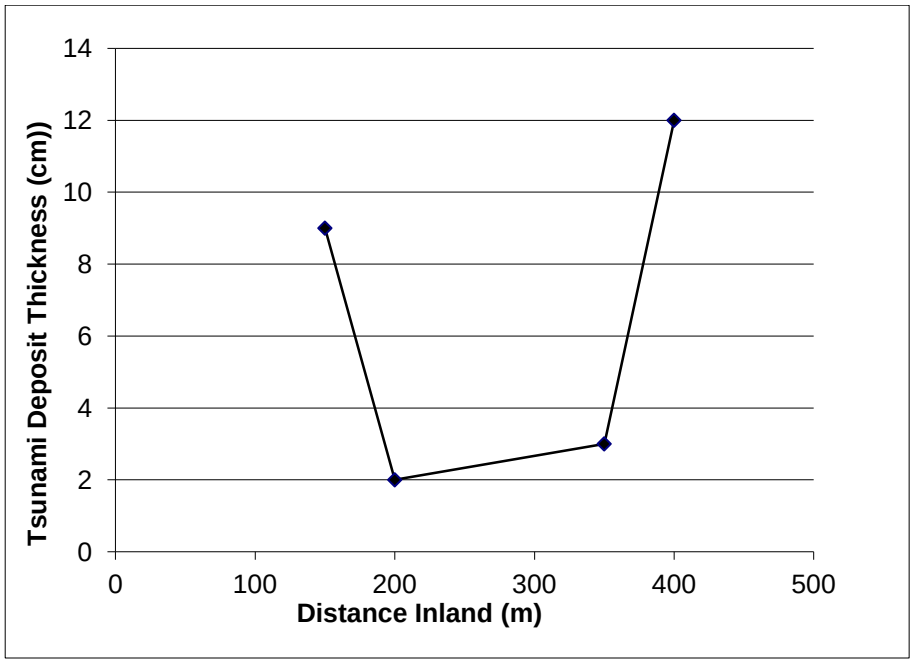

Figure 16. Interpreted tsunami thickness at Aalikuppam. The candidate tsunami deposit was measured at locations along the Aalikuppam transect. Zero distance inland represents the mean swash zone.

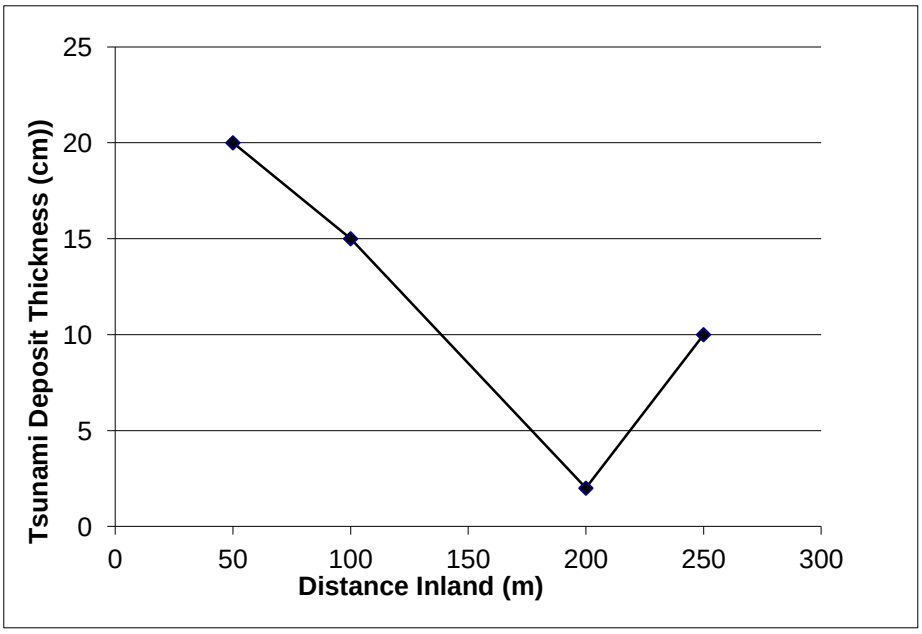

Figure 17. Interpreted tsunami thickness at Karikattakuppam. The candidate tsunami deposit was measured at locations along the Karikattakuppam transect. Zero distance inland represents the mean swash zone.

Field Observations of Candidate Tsunami Deposits

The deposits that we interpreted as derived from the 2004 tsunami were most often delineated by numerous mafic mineral laminations proximal to the coastline and were light tan in color, while the underlying units were oxidized red and usually structureless. There were a few locations where the mafic laminations were concentrated in specific intervals within the inferred tsunami deposits. At Mamallapuram, the laminations were concentrated near the bottom of the unit (Fig. C10). At Thiruvadandhai, the laminations were concentrated near the surface, with faint laminations near the middle of the candidate tsunami sand (Fig. C8). At Vedaranyam, in the south, the laminations were located throughout the deposit vertically (Fig. C16). There were no shells noted at most of our pits, with the exception of the tidal lagoon at Muttukaddu, which had trace shells within and below the tsunami deposit (Fig. C6). Select samples from the candidate tsunami sediments at Mamallapuram were prepared in the laboratory for diatom analysis, but a cursory examination under the microscope did not indicate the presence of any diatoms.

The sedimentary units underlying the candidate 2004 tsunami deposits were commonly mottled red and gray, suggesting both oxidation and reduction. Being close to the water table, it is assumed this characteristic is a result of water table fluctuation. At most sites, there was some degree of soil development on the surface buried by the candidate tsunami deposits, evidenced by fine-grained organic material, vegetation and occasional bioturbation. In some cases, when soil development was limited because of being topographically above the water table, the underlying units were also laminated and

tan. The only key identifier of tsunami deposits in these locations was the presence of erosional features such as a hummocky lower boundary or clay rip-up-clasts (Figures C14, C16). There were multiple sites where no clear tsunami boundary could be delineated. In most cases, these were southern sites and the candidate tsunami deposits were very close to the water table.

Grain Size Statistics

In order to differentiate the candidate tsunami deposits at different sites in the field we had to identify erosive features at the lower boundary, color variations, and mafic mineral laminations within the tsunami deposits. Erosive features were more easily identifiable in the southern sites where there were few barriers to inundation. In some cases, it was not possible in the field to positively identify which sedimentary unit had been deposited by the tsunami. This section is intended to better categorize the candidate tsunami deposits based on their sedimentary statistics. Table 2 shows a summary of relevant statistics for different groupings of samples.

In the laboratory we analyzed 151 samples for grain size and then calculated sorting, skewness and kurtosis. The average grain size of the tsunami samples in the south was substantially less than that in the north—2.25φ and 1.14φ, respectively (Figures 18, 19; Table 2). The most likely influencing factor in the r grain size of the southern sites is the general coastal geomorphology, which is intimately tied to the Source of the sediment (Fig. 18). Regionally, the Cauvery River system present in the southern study sites has brought sediment over a farther distance from the Precambrian source rocks than the fluvial systems draining the northern study sites. All of the

TABLE 2. GENERAL GRAIN SIZE STATISTICS

Type	Mean φ	Sorting φ	Skewness	Kurtosis
All Tsunami North	1.14	0.69	0.04	0.95
All Non-tsunami North	1.23	0.73	0.06	1.02
All Tsunami South	2.25	0.74	0.09	1.03
All Non-tsunami South	2.38	0.87	0.16	1.28
Geomorphic Category 1				
Tsunami North	1.19	0.68	0.04	0.86
Non-tsunami North	1.35	0.70	0.05	0.93
Tsunami South	2.26	0.64	0.02	0.75
Non-tsunami South	2.47	0.57	0.06	0.60
Geomorphic Category 2				
Tsunami North	0.98	0.69	0.05	0.92
Non-tsunami North	1.01	0.74	0.07	1.04
Tsunami South	2.09	0.57	0.03	0.60
Non-tsunami South	2.21	0.68	0.01	0.87
Geomorphic Category 3				
Tsunami North	1.17	0.66	0.03	0.80
Non-tsunami North	1.08	0.66	0.03	0.81
Tsunami South	2.23	0.73	0.08	1.01
Non-tsunami South	2.11	0.93	0.21	1.55
Geomorphic Category 4				
Tsunami North	2.64	1.04	0.04	1.94
Non-tsunami North	2.51	1.12	0.17	2.31
Tsunami South	2.87	1.68	0.53	3.44
Non-tsunami South	3.24	1.92	0.63	3.31

Note: Larger phi values equal smaller grain size

southern study sites with the possible exception of Cuddalore lie within the ancestral Cauvery River delta, as seen on satellite images (Fig. 2). Six out of eight northern sites have distinct seaward beach ridges within a few meters of the current swash zone that were able to act as barriers to the 2004 tsunami. In the south, the general geomorphology

is that of a low coastal plain, and relatively few barriers existed to impede the 2004 tsunami waves.

The difference in grain size between north and south (Table 2, Figures 18, 19) necessitates separate discussion of the tsunami sediments relative to the non-tsunami sediments. However, one of the common links between the northern and southern sites was the grain size of the inferred tsunami sediments in Geomorphic Categories 1 and 2 was coarser than the underlying non-tsunami deposits. In contrast, the grain size of the

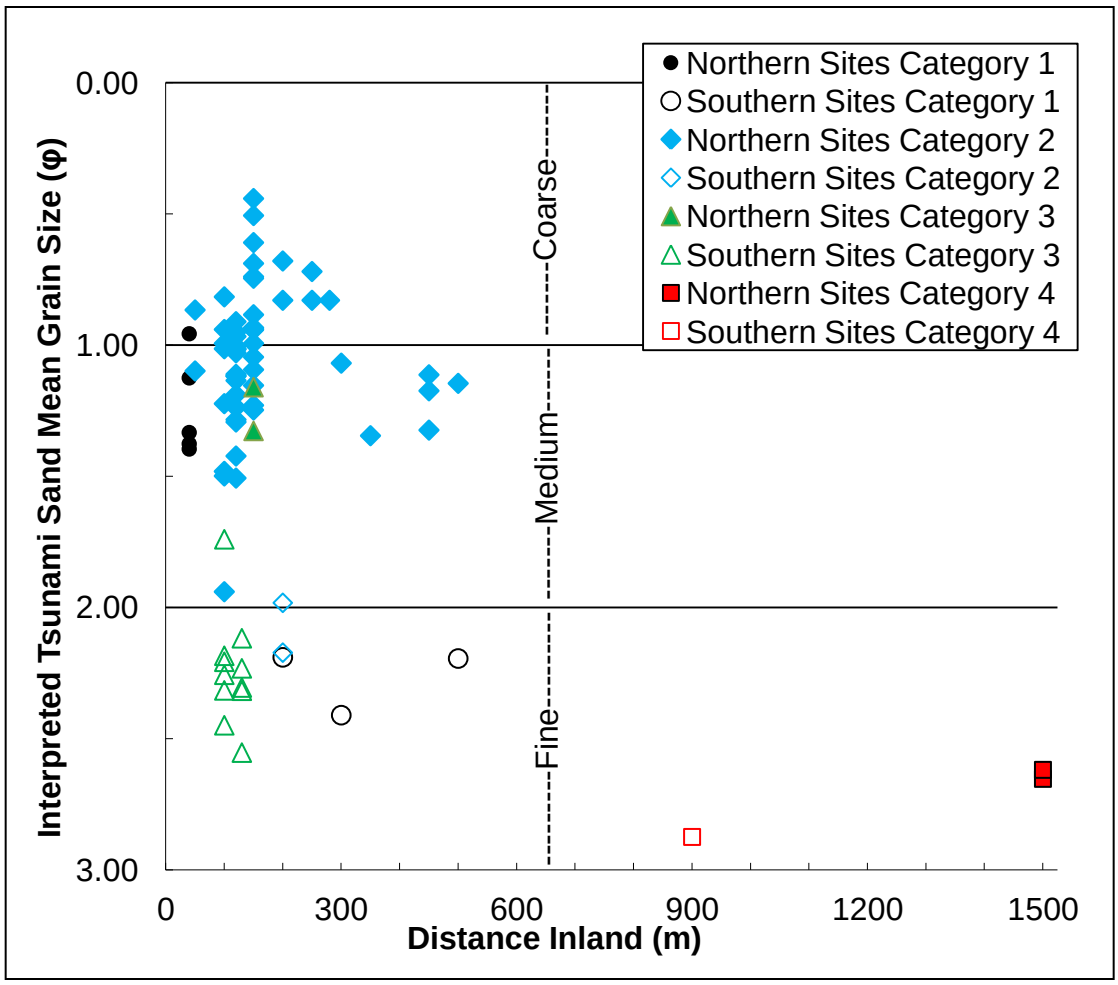

Figure 18. Comparison of northern and southern sites interpreted tsunami sand. Mean grain size is plotted relative to geomorphic category. Note: larger phi values equal smaller grain sizes.

inferred tsunami sediments in Geomorphic Category 3 was finer than the underlying non-tsunami deposits (Table 2). It is expected that the high velocity flow of the tsunami wave would entrain the sediment available for transport. Although this logic is consistent with findings in this study (Table 2, Fig. 18), perhaps the reason that the disparity is not greater is that the available sediment for transport was already reworked by coastal processes prior to the 2004 event removing the finer fraction of sediment.

The sorting for all of the inferred tsunami sediment samples in the north and south (0.69φ, and 0.74φ, respectively) was slightly better than the sorting for the non-tsunami deposits in the north and south (0.73φ, and 0.87φ, respectively; Table 2, Fig. 19). This difference was most prominent for Geomorphic Categories 2, 3 and 4 in the southern sites. In Geomorphic Categories 1, 2 and 3 in the northern and southern sites, tsunami and non-tsunami sediments were moderate to moderately well sorted. This pattern is most likely due to the dominant process being primarily waves, tides (categories 1 and 2) and fluvial (category 3). In Geomorphic Category 4 in the northern and southern sites, tsunami and non-tsunami sediments were poorly sorted. The source of the sediment in this case is interbedded, lagoon sand and clay. The similarity in sorting of the tsunami and non-tsunami sediments points towards a localized source of sediment as well as a minimal influence from sediments outside of the lagoon.

The southern sites were slightly finely-skewed (0.11φ) compared with the northern sites (0.05φ). The inferred tsunami sediments showed near-symmetry with the northern sites at 0.04φ and the southern sites at 0.09φ. The non-tsunami sediments were slightly finely-skewed compared with the tsunami sediments. The northern non-tsunami sediments were 0.06φ and the southern non-tsunami sediments were 0.16φ. The separation and deposition of the fine tail of the sediment fraction at the inland extend of inundation has been documented in the 2004 tsunami deposits in India (Srinivasalu et al.,

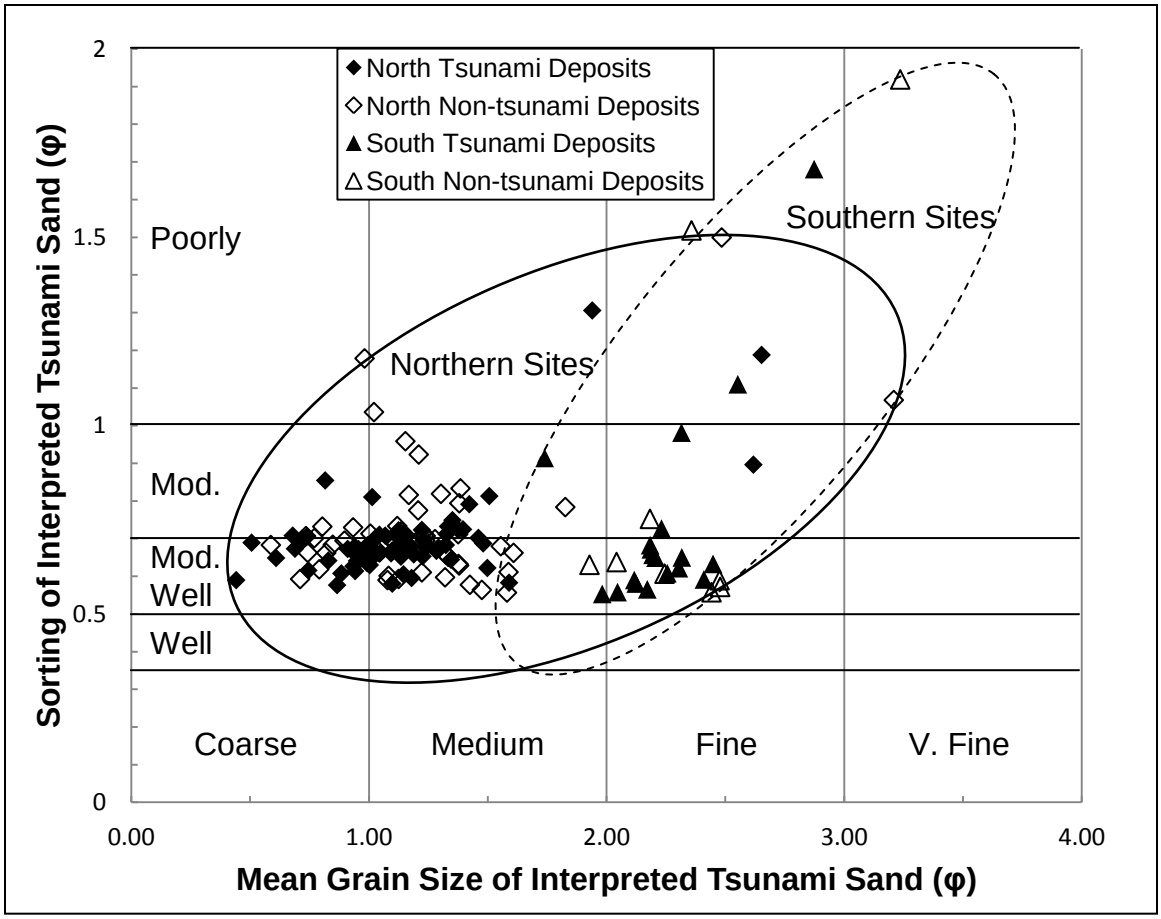

Figure 19. Mean grain size vs. sorting. The candidate tsunami deposits and non-tsunami deposits in the northern and southern study sites are plotted. Note: larger phi values equal smaller grain sizes.

2007). It is somewhat surprising that the difference is not greater; given that at multiple sample sites local residents described standing water for many days to weeks after the 2004 tsunami inundated the coastline, which would provide the low energy conditions to deposit fine sediment to thon top of the tsunami deposits. However, at these locations, no discernible clay or silt layer was found at the surface. The preexisting sediments evidently had little to no clay and silt for the tsunami to entrain. This pattern makes sense in the context of the geomorphology of the northern sites being primarily coastal with wave and tide energy reworking, and the southern sites having coastal and fluvial reworking due to the presence of the Cauvery River delta.

Although no analysis using only kurtosis has successfully distinguished transport mechanisms (Prothero and Schwab, 2004), there were some notable differences between the candidate tsunami and non-tsunami sediments in certain geomorphic environments. In Geomorphic Category 1, in the southern sites, the tsunami eroded preexisting sediment that had a very flat distribution (0.60) of sediment and deposited sediment with a flat distribution (0.75). In contrast, in category 2, in the southern sites, the tsunami eroded preexisting sediment with a flat-normal distribution (0.87) and deposited sediment with a very flat distribution (0.60). In addition, at Geomorphic Category 3, in the southern sites, the tsunami eroded sediment with a peaked distribution (1.55) and deposited sediment with a normal distribution (1.01). Changes in kurtosis can be difficult to explain, but in the case of a tsunami inundation turbulent flow likely leads to significant variation of kurtosis over short lateral and vertical distances as seen in the depth profile at multiple pits in this study (Figures 21-24, 26, 27-29). There were also differences between the

geomorphic environments prior to being inundated by the 2004 tsunami: Categories 1 and 2 showed a normal to slightly flat distribution, category 3 showed a flat distribution in the northern sites but a peaked distribution in the southern sites, and category 4 was very peaked to extremely peaked (Table 2). The peaked distribution of the lagoon sediments of category 4 can be seen in the field in the form of interbedded sand and clay (Fig. C6).

Discussion of Grain Size Characteristics

The grain size differences detected in this study were small. When comparing the differences in mean, sorting, skewness and kurtosis between the tsunami and non-tsunami deposits, the southern sites showed greater variation than the northern sites. This could be related to higher runup and inundation values in the southern portion of the study section (Peterson et al., 2005), which might imply higher energy flow conditions. The small statistical differences between tsunami sand and underlying sand might not be detectable in a deposit many years after deposition, making statistical measures alone a very uncertain means of identifying potential paleotsunami deposits.

It appears that the most important factor affecting the character of the 2004 tsunami deposits in India was the available sediment for transport (Figures 18, 19). The grain size in Figure 18 shows distinct clustering of northern and southern deposits and indicates that there is a lesser dependence on geomorphic category and little to no correlation with distance from coast. This result highlights the importance of understanding regional geormorphology and sediment source as well as accurately classifying the sediments in different geomorphic environments and identifying them in the stratigraphic record when searching for paleotsunami deposits. There is also a

substantial correlation between geomorphic setting and grain size (Figures 18, 19). It is logical to conclude that geomorphic setting and available sediment for transport were intimately related prior to the 2004 tsunami event and that both have significant impacts on the grain size characteristics of tsunami sediments.

Individual Site Grain Size Statistics

The statistics for each detailed pit we sampled in the field is shown in Figures 20 through 26. At each detailed pit we sampled the candidate 2004 tsunami sand even if it was at the surface and bioturbated, such as shown in Figures 22, 24 and 25. Detailed transects are shown for Mamallapuram, Thiruvadandhai and Aalikuppam (Figures 27, 28, 29). Note that smaller phi values represent larger grain size.

Discussion of Grain Size Patterns at Individual Sites

Some of the detailed pits highlight that there has been some reworking of tsunami sediment due to vegetation growth at the surface (for example Mamallapuram Pit 3, Figures 11, 24, A17). Multiple detailed pits had varying grain size with depth, indicating possible evidence of turbulent flow conditions or multiple wave profiles (Figures 20, 22-24). At Thiruvadandhai (Fig. 22) and Mamallapuram (Fig. 24) in particular there is significant variation and fine-scale grading, on the order of 3-5 cm with depth. This pattern could be interpreted as being the signature of multiple waves (Srinivasalu et al., 2007), or as a result of turbulent flow. Though the grain size variation was difficult to discern in the field, grain size measurements indicate that Thiruvadandhai possibly shows four graded beds but only three waves struck the study region.

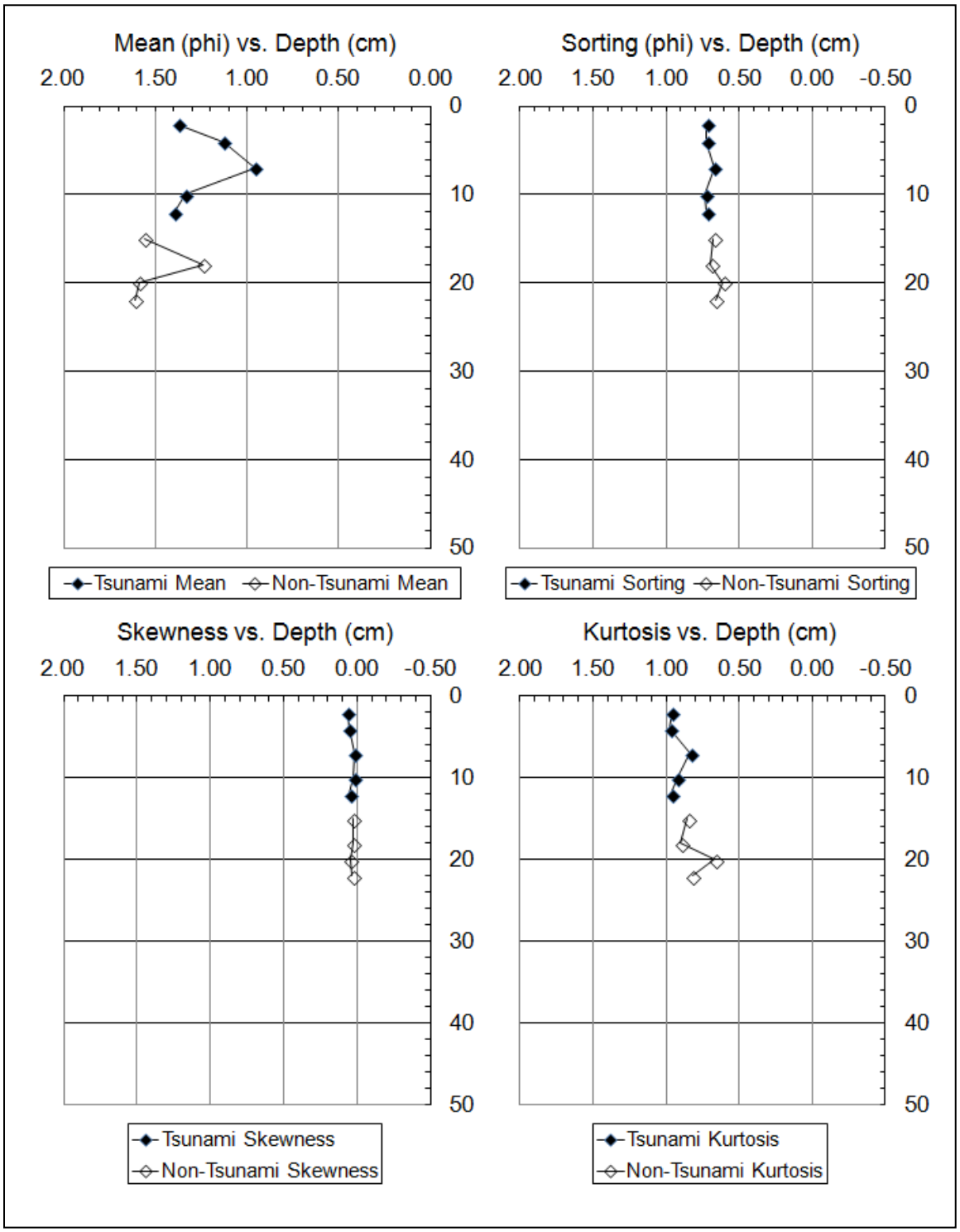

Figure 20. Kovalam Pit 1 (northern site) grain size statistics. Vertical axis is the pit depth (cm).

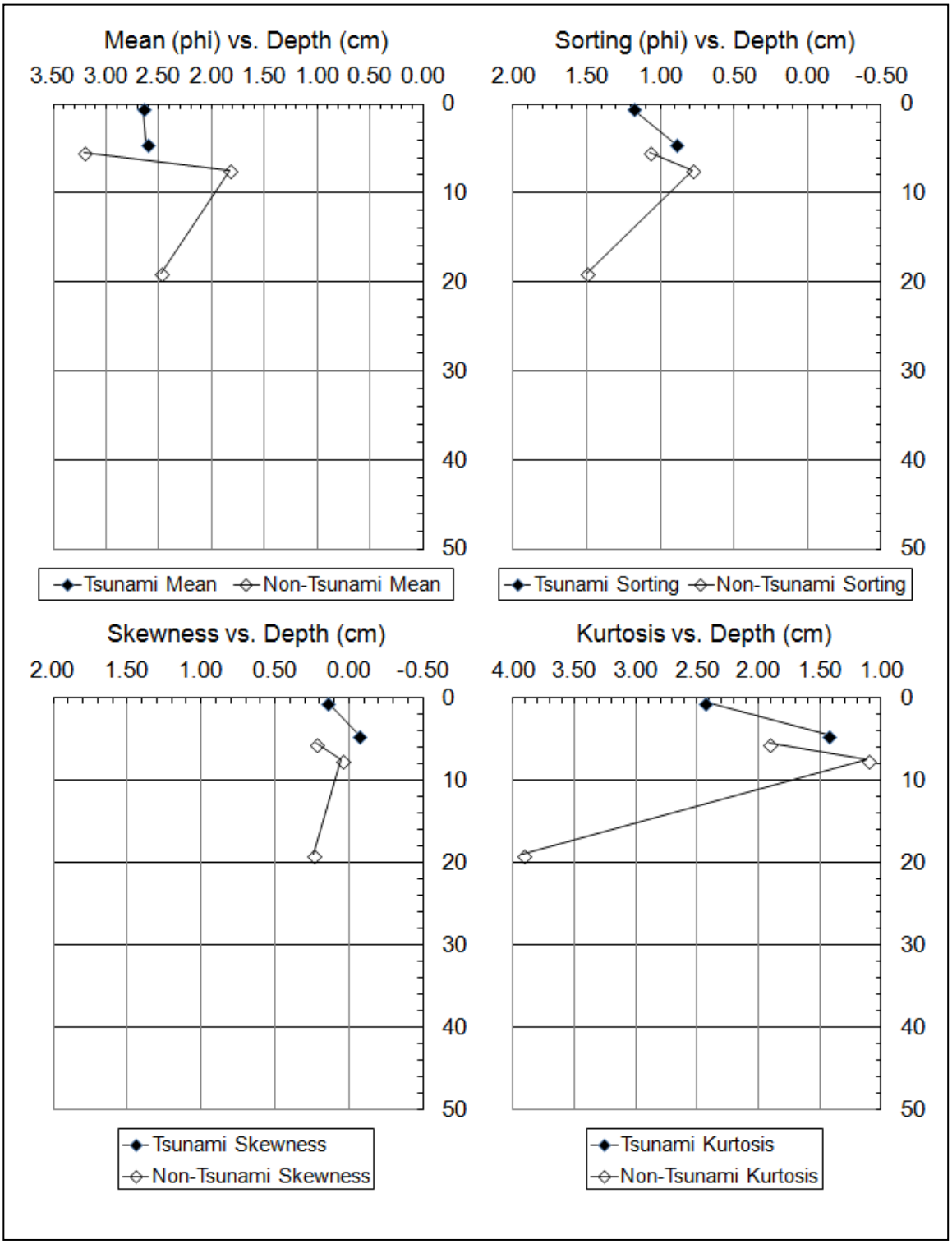

Figure 21. Muttukaddu Pit 1 (northern site) grain size statistics. Vertical axis is the pit depth (cm).

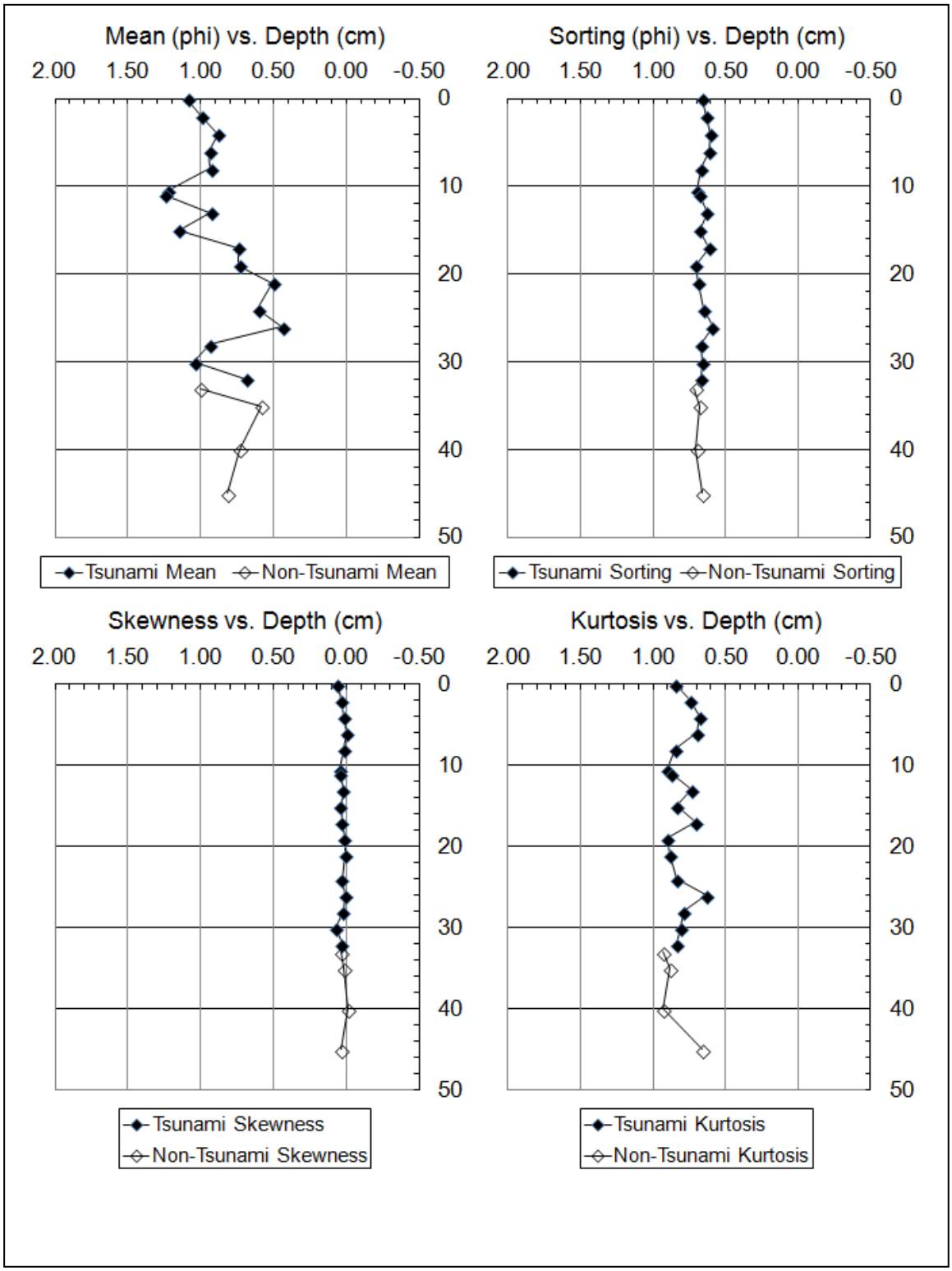

Figure 22. Thiruvadandhai Pit 3 (northern site) grain size statistics. Vertical axis is the pit depth (cm). Inverse grading occurs where sediment becomes coarser (smaller phi values) upsection and normal grading occurs where sediment becomes finer (larger phi values) upsection.

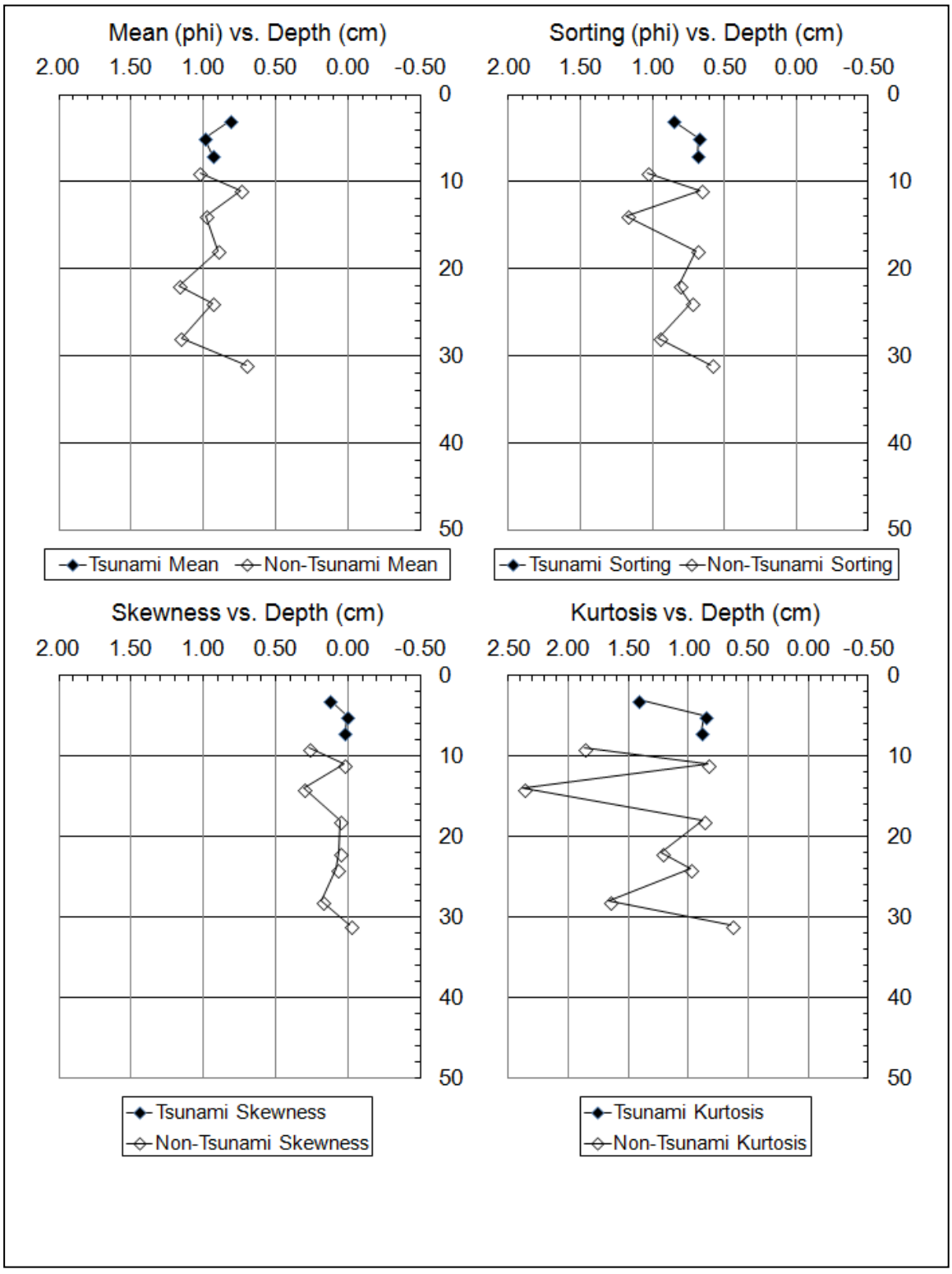

Figure 23. Vadanemelli Pit 1 (northern site) grain size statistics. Vertical axis is the pit depth (cm).

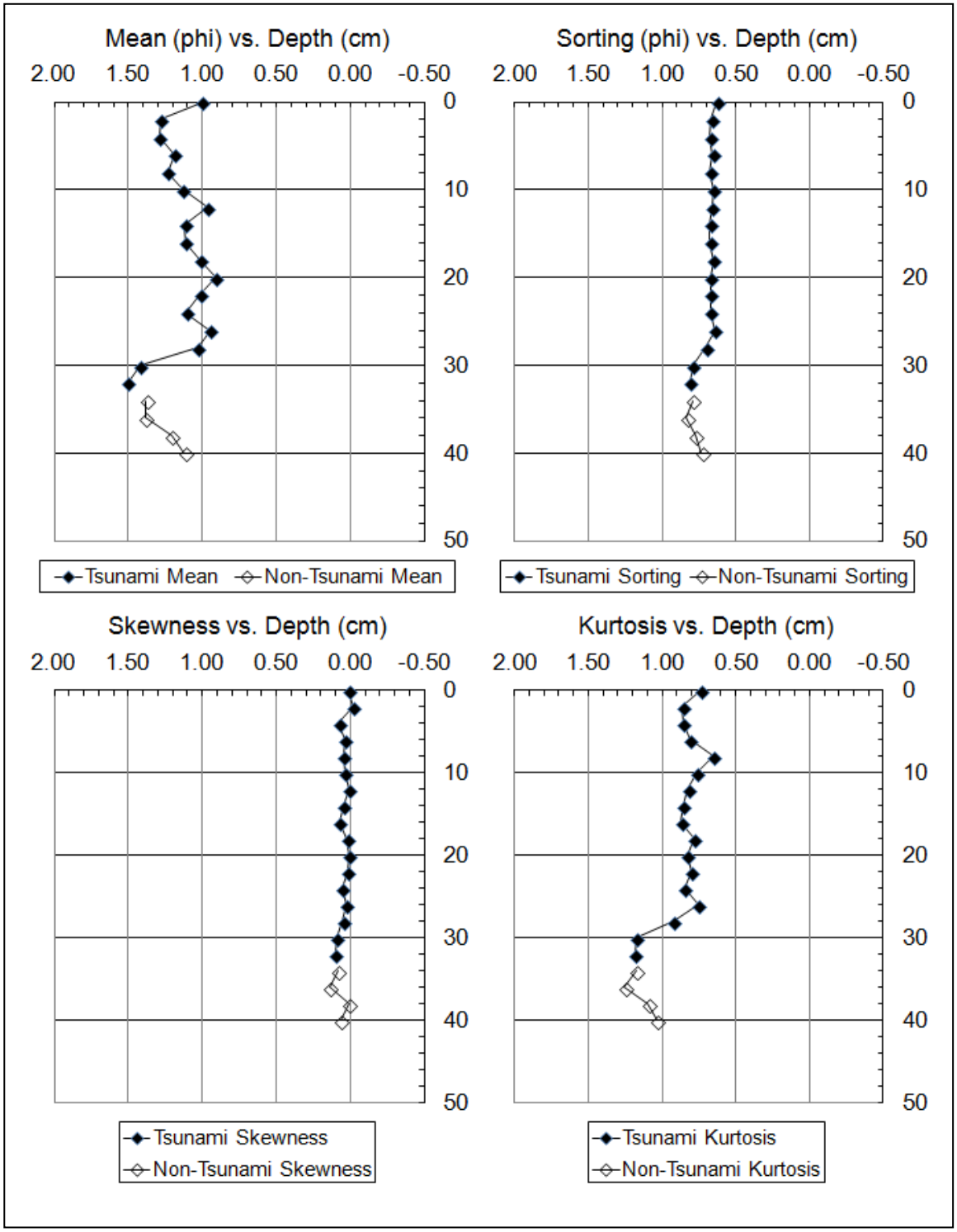

Figure 24. Mamallapuram Pit 1 (northern site) grain size statistics. Vertical axis is the pit depth (cm). Inverse grading occurs where sediment becomes coarser (smaller phi values) upsection and normal grading occurs where sediment becomes finer (larger phi values) upsection.

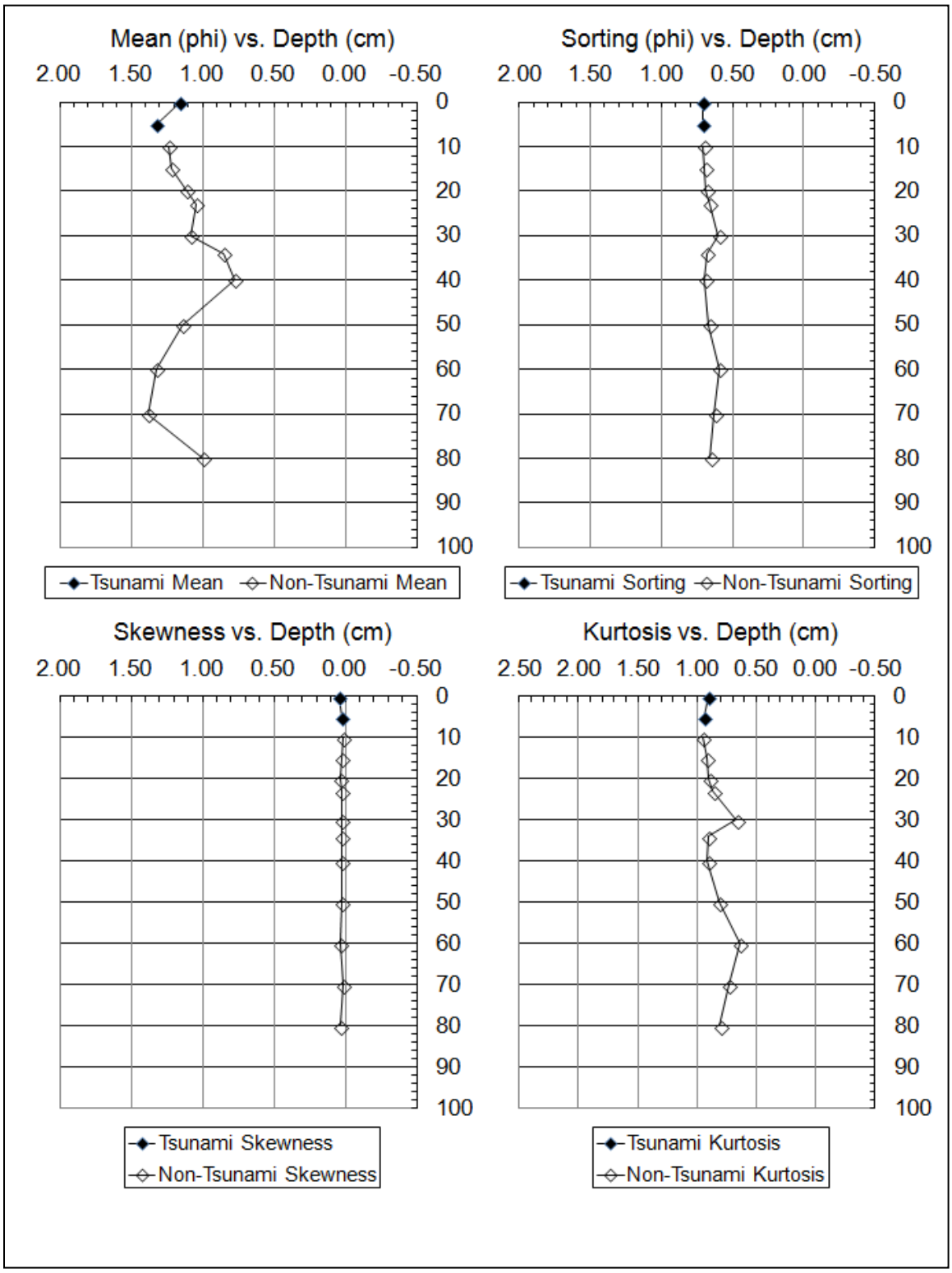

Figure 25. Aalikuppam Pit 1 (northern site) grain size statistics. Vertical axis is the pit depth (cm).

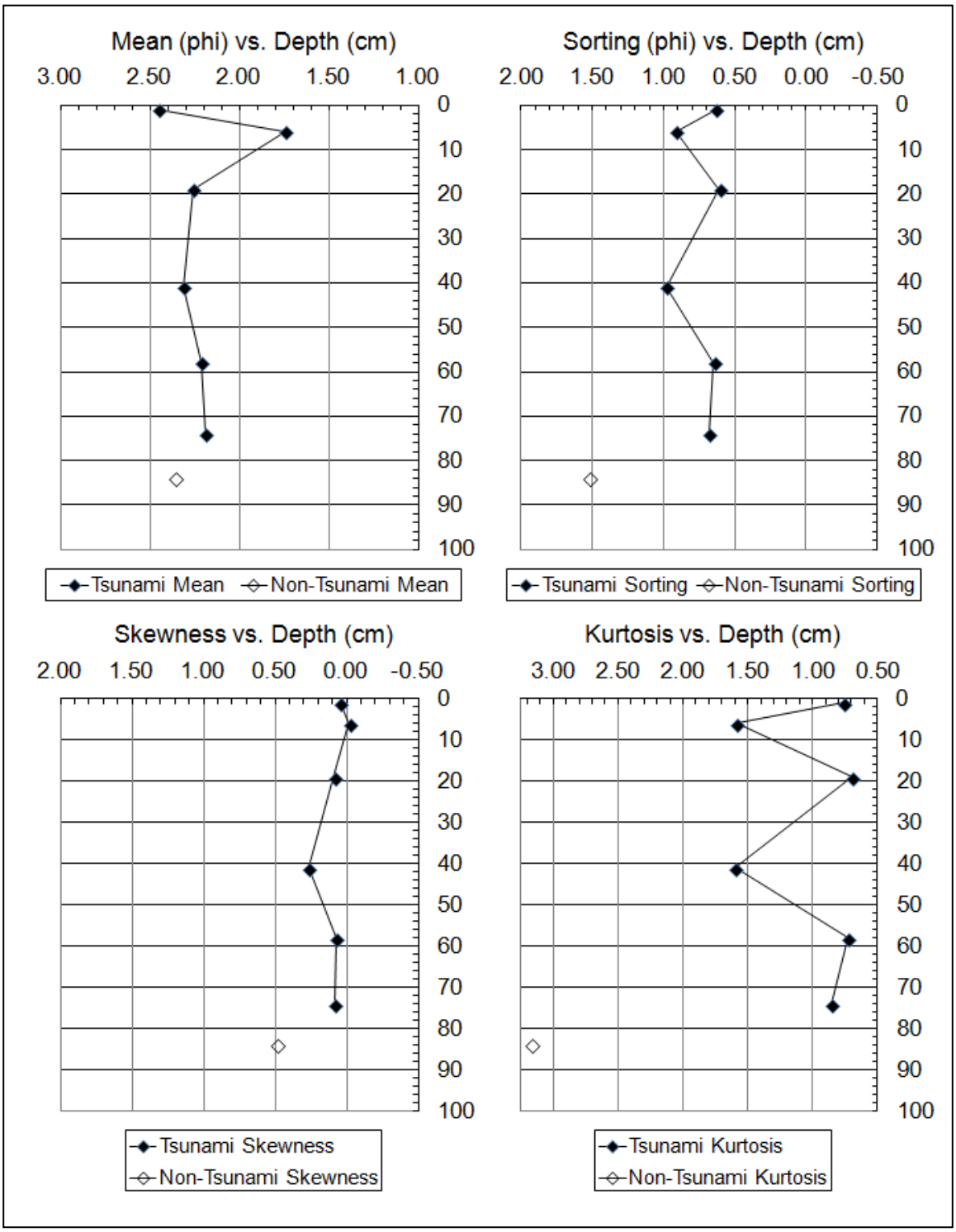

Figure 26. Vailanganni Pit 1 (southern site) grain size statistics. Vertical axis is the pit depth (cm). This was the only detailed pit analyzed in the southern sites.

The margins of the lagoon at Muttukaddu had a much wider variation in grain size statistics than any other site (Fig. 21). This pattern is consistent with field observations of fine sediments interbedded with medium sands underlying the tsunami deposits. Though the candidate tsunami deposits were clearly recognized in the field by the abrupt, hummocky lower boundary, dark mafic mineral laminations and lack of soil development at the surface (Figures A5, C6), there was only a small measurable difference in grain size between the candidate tsunami deposit and the underlying sediments at Muttukaddu. It would be difficult to contrast this sand layer with a future storm deposit except that it is significantly thicker than the preexisting interbedded sandy layers.

In contrast, in the sandy beach environments of Thiruvadandhai and Mamallapuram there are no clear distinguishing traits when comparing the grain size statistics to the underlying sediments (Figures 22, 24). The small-scale graded beds within the tsunami deposit at Thiruvadandhai (Fig. 22) may represent the complexity introduced by turbulent flow and/or multiple waves as suggested by a previous study at this location (Srinivasalu et al., 2007). However, the underlying sediments also show similar grain size variations to the tsunami deposits such that they are not distinguishable from the tsunami sediments. The best sedimentological indicators of tsunami deposits in these sandy environments is the abrupt, erosive, hummocky lower boundary and mafic mineral laminations observed in the field.

The river sediment at Aalikuppam shows that the available sediment for transport was well sorted, medium sand (Fig. 25). There was little to no variation in grain size between the candidate tsunami sand and the non-tsunami sand indicating that the primary

source of sediment entrained by the tsunami was most likely fluvial sediments.. The tsunami deposit was identifiable in the field by an abrupt, erosional lower boundary and tan color but the deposit itself was structureless. It would be very difficult to identify the paleotsunami deposits at Aalikuppam at the timescale of the long tsunami recurrence intervals in the Indian Ocean basin.

The 2004 tsunami deposits were difficult to identify in the field at Vailanganni (southern site). The potential tsunami sand was structureless with no clear erosional boundary. The grain size shows grading from 0-20 cm depth and a structureless sand from 20-78cm (Fig. 26). This pattern is most likely the result of misidentifying the tsunami deposit in the field, with the total thickness being closer to 20 cm instead of 78 cm. A thinner deposit would be more consistent with the thicknesses we measured at our other sites. It is likely that our sampling interval was not detailed enough to reflect the real variations between samples. This environment made it very difficult to distinguish the 2004 deposits after only 3 years, thus making it an unlikely site for preservation and recognition of paleotsunami deposits.

There was consistent sorting in the tsunami deposit at Mamallapuram and Kovalam despite variations in mean grain size (Figures 20, 24). This is likely due to the effect of mafic mineral laminations on mean grain size. When the sampling depth contained a higher proportion of mafic minerals, the measured grain size was finer. The size contrast between the coarser quartz sand grains and the smaller fraction of mafic minerals was minimized by the laser diffractometer relative to the wet sieve method (Figures 32, 33). As a result, when the sample contained a larger proportion of mafic

minerals, the grain size showed about 0.25ϕ smaller shift (the sample measured coarser) with laser diffractometer analysis. The resulting sorting calculations also indicate that the variation in the grain size population displayed a much smaller shift with the laser diffractometer analysis. See the section Comparing Mastersizer Data to Sieve Data for further discussion.

Transect Analysis

The transects of Thiruvadandhai, Mamallapuram and Aalikuppam are summarized in Figures 27, 28 and 29. The values at any given distance represent the average value (of a given grain-size characteristic) of multiple samples within the candidate tsunami deposit vs. the preexisting sediment. This approach allows an analysis of what kind of effect the coastal geomorphology had on the sediment deposited by the tsunami. Overall, the three sites showed little variation between the candidate tsunami sediments and the underlying sand, indicating that the available sediment for transport is the most significant factor in the statistical values. These graphs show that taking a transect perpendicular to the coastline does not provide any distinguishing characteristics of the 2004 tsunami deposit sand sheet as it was deposited inland that would aid a future investigation in identifying paleotsunami deposits in sandy geomorphic environments.

It is worth noting that where the tsunami sediments were finer than the non-tsunami sediments there was a significant increase in black mafic mineral laminations relative to the underlying sediments (100 m and 250 m inland Thiruvadandhai Fig. 27; 200 m and 250 m inland at Mamallapuram Fig. 28). In hand sample, these mafic mineral grains were finer overall, and much more elongate than the quartz-dominated sand. The

lack of mafic mineral laminations seen in the landward extents of the tsunami deposits in Mamallapuram and Thiruvadandhai most likely represent a change in the source of the sand with landward distance.

At Mamallapuram and Thiruvadandhai, where we sampled the coastal plain, the absence of mafic mineral laminations in the tsunami sand samples resulted in a coarser measurement of mean grain size (280 m, 300 m pits 6 and 7 at Thiruvadandhai Figures 22, 27 and 450 m, 500 m pits 5 and 6 at Mamallapuram, Figures 24, 28). At these distances there were no mafic mineral noted in the field and the coarser interpreted tsunami sand likely represents a beach or beach ridge (Fig. C13) source introduced to a coastal plain environment.

The slight landward coarsening of tsunami sediments at Mamallapuram (Fig. 27) and Aalikuppam (Fig. 29) is most likely due to the decreased presence of mafic mineral laminations with distance inland. In the field we noted that there were no discernible mafic mineral laminations in the tsunami deposits near their maximum landward extent. We also noted that there was a strong presence of mafic mineral laminations on the beach near the mean swash zone. This indicates that the ability for the 2004 tsunami to carry mafic minerals from near-shore sediment was limited to 250 m at Thiruvadandhai and Mamallapuram and 200 m at Aalikuppam (Fig. 27 Pit 5 and Fig. 28 Pit 3, Fig. 29 Pit 2).

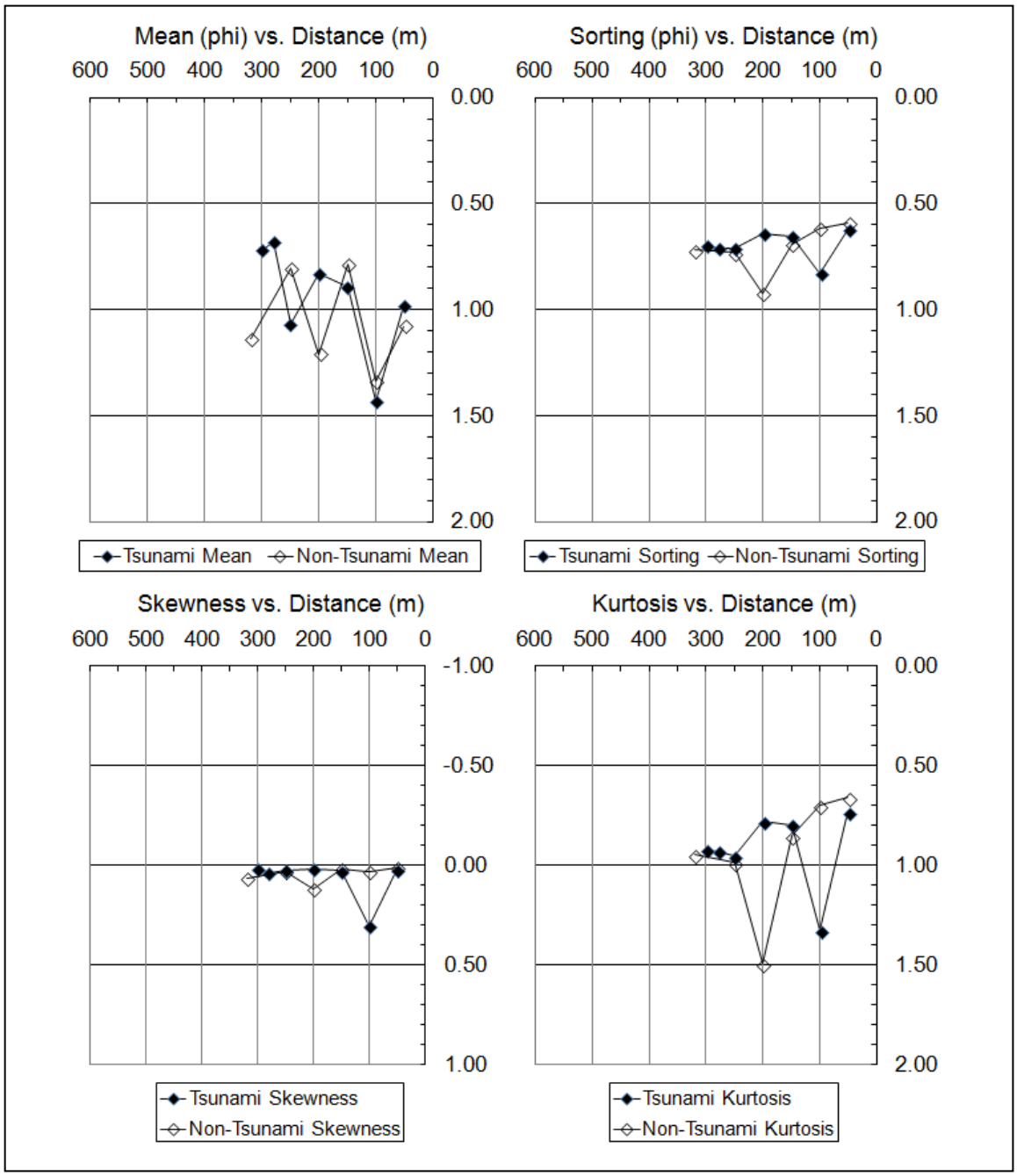

Figure 27. Thiruvadandhai transect grain size statistics. Vertical axis represents the grain size statistic referenced at the top of each graph. Zero distance inland on the horizontal axis represents the mean swash zone.

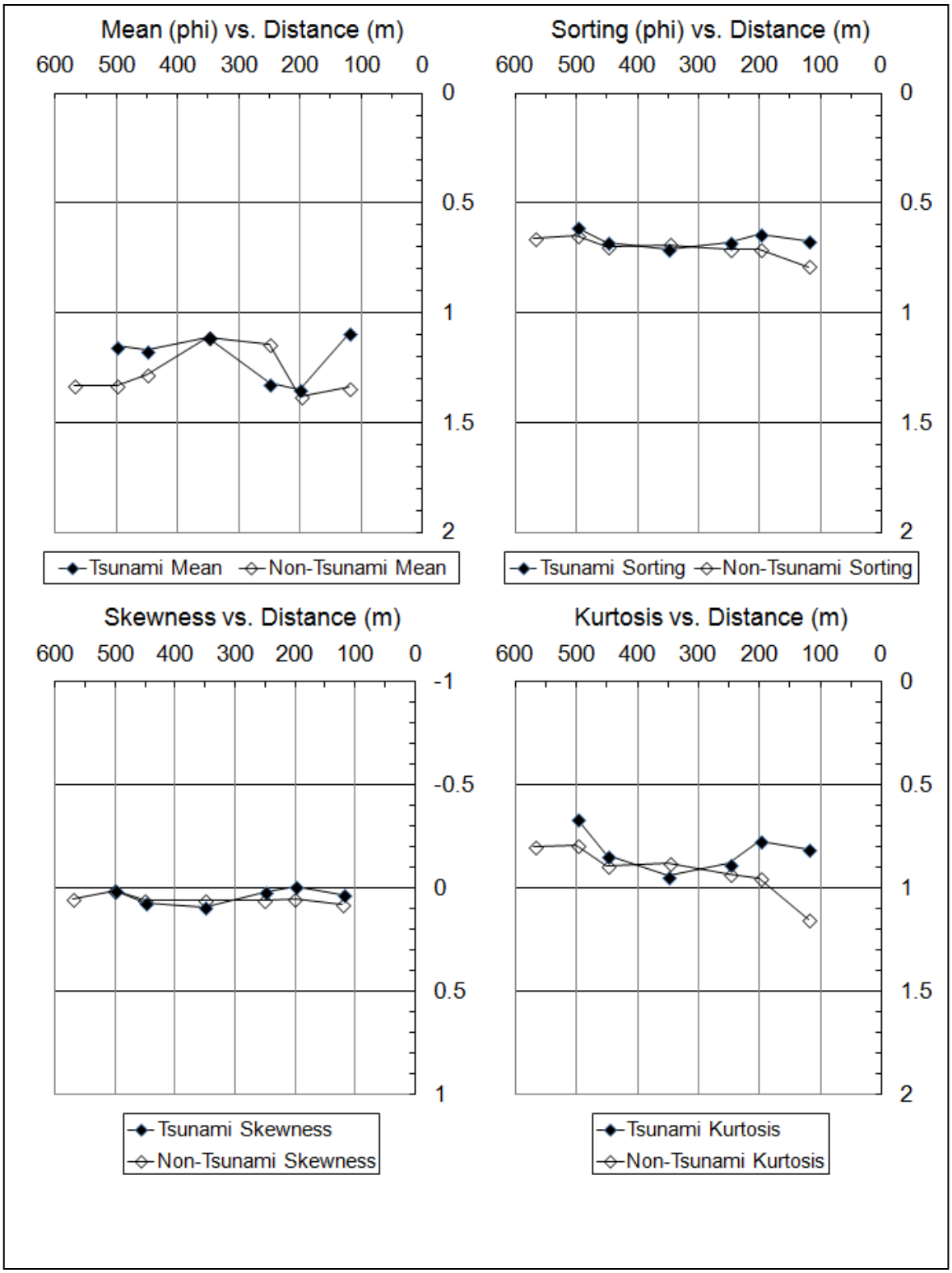

Figure 28. Mamallapuram transect grain size statistics. Vertical axis represents the grain size statistic referenced at the top of each graph. Zero distance inland on the horizontal axis represents the mean swash zone.

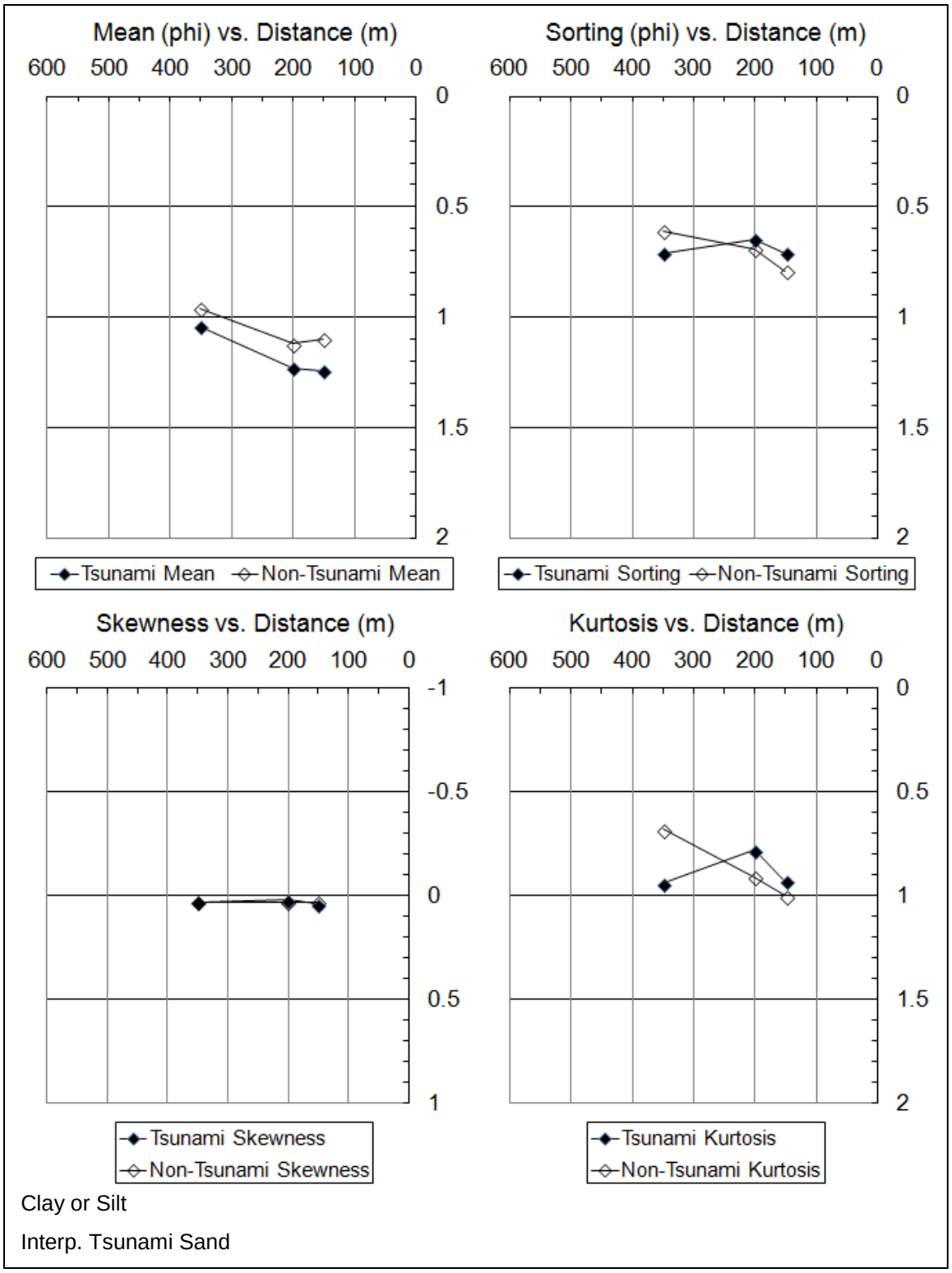

Figure 29. Aalikuppam transect grain size statistics. Vertical axis represents the grain size statistic referenced at the top of each graph. Zero distance inland on the

Comparison with Srinivasalu et al. (2007)

This section compares results taken by Srinivasalu et al. (2007) to the some of the same sites analyzed in this study in an effort to identify post-depositional change since the 2004 tsunami, which will provide better insight into long-term preservation potential. Srinivasalu et al., (2007) collected samples at Thiruvadandhai and Mamallapuram. Personal communication with the author (2008) indicated that we sampled from the same sites along similar transects near the tsunami scour fans. Figures 29 and 30 show grain size statistics for tsunami deposits only. The raw data from Srinivasalu et al., (2007) was not available so we plotted our data on his graphs. As such, this discussion analyzes only general trends such as grading and relative grain size.

The comparison of sieve data from samples taken days after the 2004 tsunami (Srinivasalu et al., 2007), to Mastersizer data from samples taken less than four years after the event, enables two trends to be identified. The first is that the sieve data, as shown in Figure 30 and 32, is about 0.1φ-0.25φ coarser than the Mastersizer data. This expected difference can be accounted for because the Mastersizer takes the average length of the long, middle and short axis on each particle whereas the sieve only measures the short axis of each particle (see Appendix B Comparison of Mastersizer Data to Sieve Data, Figures B1-B4). The second trend is the clear grading that exists at Thiruvadandhai when comparing Figure 21 at 150m from the mean swash zone (Mastersizer, 2008) to Figure 29 at 230 m from the mean swash zone (Srinivasalu et al., 2007). The grading shows a similar pattern in both graphs from about 5 cm depth to about 18 cm depth. Assuming there is some similarity between 150 m from the shoreline

and 230 m from the shoreline, this grading trend implies very little change in the tsunami deposits in the four years since the 2004 tsunami.

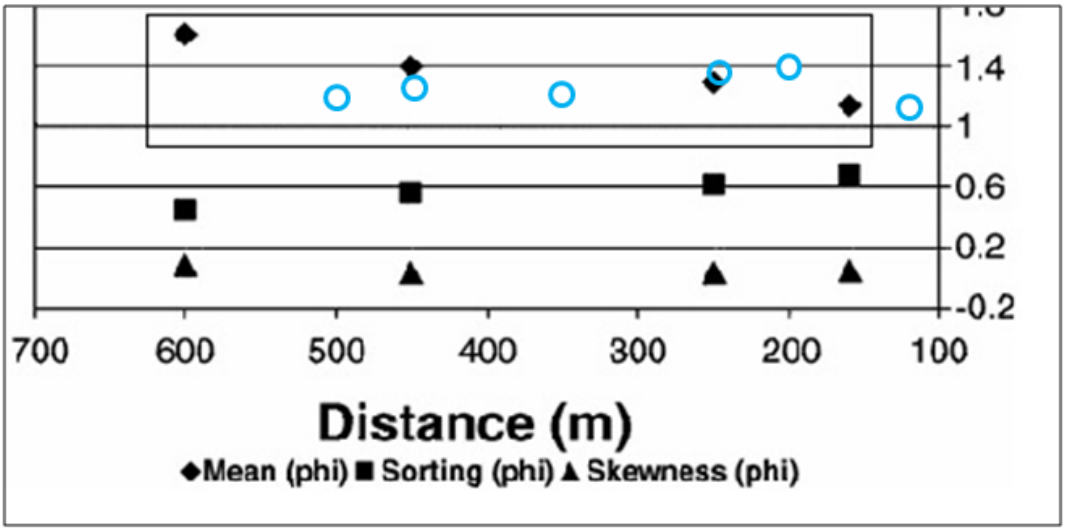

Figure 30. Comparison to Srinivasalu et al. (2007) along a transect. Mamallapuram tsunami deposit statistics are plotted along a transect (modified from Srinivasalu et al., 2007). The vertical axis is the mean grain size (ϕ). Box is around the mean grain size measured by Sinivasalu et al., (2007). Blue circles indicate mean grain size measured in this study. This study started at 120 m from the coast within a few meters laterally of where Srrinivasalu et al. sampled starting at 150 m from the coast (Fig. 28).

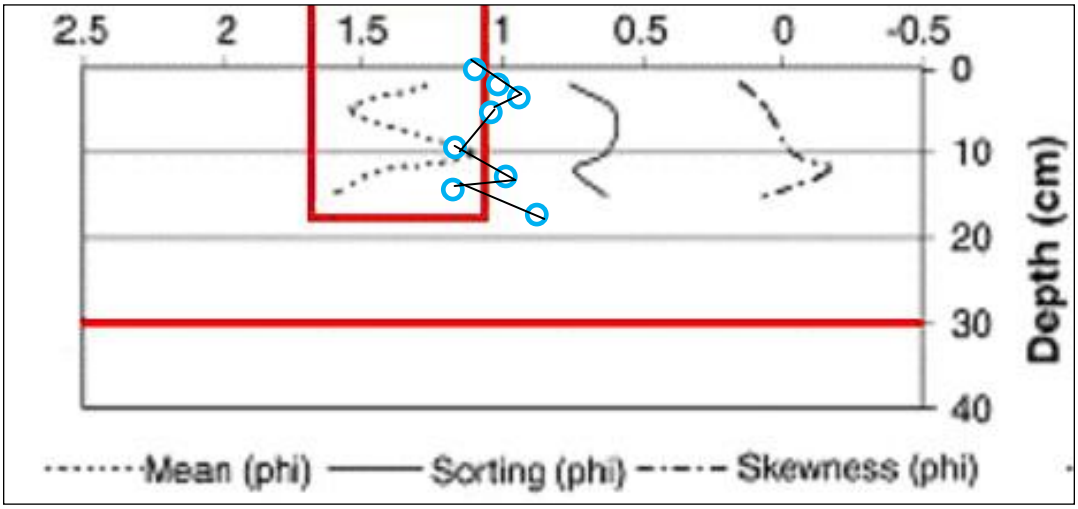

Figure 31. Comparison to Srinivasalu et al. (2007) in an individual pit. Thiruvadandhai grain size statistics 230 m away from the coastline (modified from Srinivasalu et al., 2007). Box around mean grain size delineates similar trend seen in this study. Line at 30 cm depth denotes the bottom of the recognizable tsunami deposit. Blue circles delineate mean grain size measured in this study at Pit 3, 150 m away from the mean swash zone (Fig. 22).

Summary Discussion of Grain Size Results

Commonly, the tsunami deposits in this study were identified in the field by their light tan color with mafic mineral laminations and distinct, erosional lower boundary truncating underlying red sediments. The tsunami deposits were thicker in the southern sites and were reliably traced further from the mean swash zone relative to the northern sites. There is a correlation between the geomorphic environment and the tsunami sediment thickness (Fig. 12). There is also an inverse correlation between the inundation distance and the thickness of the sediments (Figures 2, 13). However, Figures 18 and 19 indicate that the most important factor in the grain size statistics is the geographic location and therefore, the grain size properties of the source of the sediment. Thus, the available sediment for transport was the most important factor affecting the grain size statistics of the tsunami sediments.

Coastal plains with a seaward beach ridge that resulted in a tsunami scour fan such as Thiruvadandhai and Mamallapuram preserved distinct deposits that had a predictable decrease in thickness with increasing landward distance. In the field we noted that the thickest deposits were about 50 meters landward of the tsunami scour fan, and as the tsunami spread out over the coastal plain the waning energy allowed a predictable landward thinning of the tsunami sandsheet. In contrast, river floodplains such as Aalikuppam had highly variable thickness with landward distance. In addition the river sediments contained better sorted sediment than other geomorphic environments and had fewer mafic minerals available to yield laminations within the tsunami deposits.

As a result the tsunami deposits were more difficult to correctly identify in the field at Aalikuppam.

Mafic mineral laminations were concentrated at the proximal pits relative to the mean swash zone, and in some individual samples skewed the grain size statistics toward the finer grain size fraction. Overall, there were only small detectable statistical differences between the tsunami deposits and the underlying sediments. The tsunami deposits were slightly (0.1 ϕ) coarser, slightly (0.1 ϕ) better sorted, with no detectable skewness difference and they were excessively peaked (0.1 difference in the northern sites and 0.25 difference in the southern sites) relative to the preexisting sediments.

Different geomorphic environments produced distinct groupings of mean grain size. The finest sediments were found in the lagoons and river sediments. The northern and southern site groupings also produced distinct mean grain size differences with the southern deposits being 1 phi finer which is likely due to the available sediment for transport.

Plotting mean grain size versus sorting of candidate tsunami deposits shows that there is greater differentiation in sorting amongst the southern sites but a greater differentiation in mean grain size among the northern sites (Fig. 19). The smaller grain size variation in the southern sites is likely due to most of the sediment initiating being sourced from the Cauvery River delta and then being subsequently reworked in some locations as the river avulsed to new channels. The larger range of sorting in the southern sites is likely a function of geomorphic environment as there is a distinct clustering of moderate sorting that represent the majority of sampling sites and the finest sand fraction

correlates with the poorest sorting (Fig. 19). The large variation in grain size in the northern sites can be explained by the different geomorphic environments. The tidal lagoon at Muttukaddu had fine-grained sand but the majority of coastal locations such as Thiruvadandhai had medium grained sand sourced from the beach and reworked by waves and tides.

Detailed sampling at some individual pits indicated distinct grading within the tsunami deposits. One possibility is that the inundation by each of the three waves produced normally graded beds as the tsunami energy waned (as suggested by Srinivasalu et al., 2007) and turbulent flow introduced small-scale inverse grading into the deposits. It could also be exclusively a function of turbulent flow.

Transect analysis and comparison of mean grain size with Srinivasalu (2007) indicates that there has been very little or no change to many of the tsunami deposits between 2004 and 2008, supporting the possibility of good preservation potential at sites with distinct beach berms such as Mamallapuram and Thiruvadandhai. However, differentiating these deposits from storm deposits without prior knowledge of the areas affected by the 2004 tsunami would be very difficult. Observing the geomorphic context of these sites, for example the breach in the beach ridge, is critical for interpreting the tsunami source of these sediments. Recognition of tsunami deposits based on sedimentology alone would be difficult.

The laser diffractometer analysis conducted in this study yielded very similar trends in the grain size statistics to the wet sieving method in this study when analyzing sediment collected in pits along the Mamallapuram transect. The grains were predictably

about 0.25 phi coarser when measured with the particle size analyzer as it measures the mean of all three axes of a sand grain whereas the wet sieving method measures the smallest axis.

Optically Stimulated Luminescence Data

Table 3 shows the results from selected OSL samples taken in the field. These five sites should help provide insight into relative stability of the coastline and information about the long-term rate of sediment accumulation.

TABLE 3. OPTICALLY STIMULATED LUMINESCENCE DATA

Sample Site *Pit #* *Distance* *Est. Elevation*	*Depth (m)*	*In Situ Water %*	*# Disks*	*Dose Rate (Gy/ka)*	*De, Gy (std dev)*	*OSL age (cal yr)*	*Geomorphic Setting*
Thiruvadandhai Pit 4 200 m 3 m	0.18	0.1	29	3.37 ± 0.18	0.32 ± 0.13	100 ± 40	Coastal plain
Mamallapuram Pit 3 250 m 2 m	0.35	0.1	22	2.17 ± 0.10	4.94 ± 1.42	2,280 ± 190	Coastal plain
Aalikuppam Pit 2 200 m 3 m	0.15	0.1	21	2.10 ± 0.10	0.17 ± 0.15	80 ± 20	River Floodplain
Kallar Pit 2 160 m 2 m	0.19	0.2	28	3.07 ± 0.16	0.45 ± 0.23	150 ± 70	Coastal plain
Vilundamavadi Pit 1 450 m 2 m	2.45	0.2	34	3.22 ± 0.18	0.98 ± 0.15	300 ± 50	Forested coastal plain

In situ water % compensates for the attenuating effect of water on ambient radiation.
Disks is the number of subsamples measured on steel or aluminum disks.
Dose rate is the luminescence from the sediment surrounding the sample.
Dose equivalent (De) is the preserved luminescence of the sample.
OSL age is the De divided by the dose rate.

The southeastern coast of India has a very dynamic shoreline. Mamallapuram and Thiruvadandhai are only a few kilometers from each other, and yet with similar geomorphic environments they have quite different sediment histories. The shoreline at Thiruvadandhai is only about 100 years old at 18 cm depth below the pre-tsunami surface where the 2004 tsunami inundated (200 m inland, Table 3, Figures C2, C7). In contrast, the shoreline at Mamallapuram is about 2,280 years old at 35 cm depth underlying the 2004 tsunami deposits (250 m inland, Figures C2, C10). The age of Mamallapuram implies a low rate of sediment accumulation or possibly suggests an eroding shoreline such that the younger sediments were seaward and have been eroded away. If this is the case, then it is unlikely that a paleotsunami deposit from the past 2.3 kya has been preserved as they would have been deposited seaward of this location which is only 250 m inland. In contrast, the young age of Thiruvadandhai implies a relatively high sedimentation rate, yet it is in a similar geomorphic environment and location along the Indian coast. These vastly different ages and the emerging temple at Mamallapuram imply that it is an erosional shoreline, while the young age of Thiruvadandhai could imply a prograding shoreline. To confirm this hypothesis, an OSL date should be taken at the landward dune at Thiruvadandhai that was 320 m from the mean swash zone and acted as a terminal barrier to the 2004 tsunami. That landward dune might indicate the relative position of the shoreline during the last possible large event (Sumatra, 780-990 AD, 1290-1400 AD, Monecke et al., 2008; Thailand, 1300-1450 AD, Jankaew et al., 2008; The Andaman Islands, 1000 AD, Rajendran et al. 2007).

The sample taken at Aalikuppam yielded an age of just 80 years old (Figures 6, C2, C11). This date combined with the difficulty in identifying the tsunami deposits in the field might indicate that this river floodplain is too active to reliably preserve a record of past large tsunami events. It also indicates a possible local progradation of river sediment into the Bay of Bengal. However, further evaluation and dating of landward geomorphology could prove useful in the search for paleotsunami deposits.

The geomorphic setting at Kallar is similar to Mamallapuram and Thiruvadandhai but is in the southern portion of the study area (Figures 8, 9). The OSL age of 150 years old is much closer to that at Thiruvadandhai, and the distinct tsunami deposits at this location were well preserved. The young age at this location indicates that the swales behind the landward beach ridges at this location might show potential to preserve a deposit from past large tsunami. Furthermore, investigation and dating of the landward beach ridges and swales at Kallar has potential for discovering paleotsunami evidence.

Vilundamavadi is also a location behind a distinct seaward beach ridge with well-preserved tsunami deposits over red sand (Fig. C3). This location is forested, resulting in the roots destroying many of the original laminations in the tsunami deposits. The OSL date was taken from a landward dune at 2.45 meters depth which was still about two meters above sea level. The returned age of 300 years implies a geomorphic setting that is too young to capture the documented paleotsunami deposits around the Indian Ocean. It also indicates a high sedimentation rate and recent eolian activity. We recommend additional investigation of the landward beach ridges and swales at this location when

searching for paleotsunami deposits in southeastern India, as they might mark earlier shoreline positions.

The young OSL dates from this study highlight the potential for paleotsunami preservation in the swales behind landward beach ridges at Thiruvadandhai, Kallar, Aalikuppam and Vilundamavadi, but distinguishing them from storm deposits might be problematic. If these beach ridges yielded ages of at least 700 years old they could contain the most recent documented large paleotsunami deposit from other sites around the Indian Ocean (Monecke et al., 2008; Jankaew et al., 2008). Though there is no geomorphic evidence of obvious shoreline changes over the past 1200 years at Mamallapuram (Mohapatra and Prasad, 1999), if the shoreline is eroding, as implied by the OSL age, it is highly unlikely that any tsunami from the past 2.3 kya could have been deposited at this location.

CHAPTER V

CONCLUSIONS

1) The 2004 tsunami deposits were usually clearly identifiable in the field when found on a coastal plain behind a seaward beach ridge or in a lagoon protected by a seaward beach ridge. The best geomorphic environments to find thick, well-preserved deposits of the 2004 Indian Ocean tsunami (and by proxy paleotsunami deposits) on the southeastern coast of India are those that have a distinct seaward beach ridge and consequent tsunami scour fan such as Mamallapuram, Thiruvadandhai, Kallar and Vilundamavadi. Field identifiers included the presence of mafic mineral laminations, an erosional, hummocky lower contact and tan sediment overlying red preexisting sediments. This study was not able to differentiate between the 2004 tsunami deposits and the known possible characteristics of cyclone deposits. For example, a scour fan that matches to the age of known paleotsunami deposits around the Indian Ocean basin might be attributable to a past, large tsunami but the fan itself would be difficult to distinguish from a storm overwash fan.
2) The tsunami deposits showed small, measurable differences in grain size from the preexisting sediments. Overall, the tsunami-laid sediments were slightly coarser (0.25 φ) and slightly better sorted than the preexisting sediment. While the tsunami-laid sediments were slightly fine-skewed relative to the preexisting sediments there were no consistent trends in kurtosis amongst the tsunami-laid sediments relative to the preexisting sediments. The presence of mafic mineral

3) laminations within some of the tsunami deposits made the tsunami deposits finer and more poorly sorted relative to the massive underlying quartz sand units. When absent, the tsunami deposit was massive quartz sand. The small margin of statistical difference and the possibility that the mafic mineral laminations could be reworked by bioturbation or eolian processes dictates that future studies might not be able to rely on sedimentary structures and statistics alone to identify ancient tsunami-laid sands. The 2004 tsunami deposits in individual pits at some sites showed multiple small-scale grading patterns possibly reflecting a combination of multiple waves and turbulent flow.
4) Transect-scale analysis and a comparison of southern sites to northern sites in different geomorphic settings indicate that the available sand for transport was the greatest factor affecting grain size statistics (Figures 18, 27-29). As a result of regional geomorphology and lithology, the northern sites in this study had coarser overall grain size than the southern sites (Fig. 19). However, there was a strong sorting similarity between the northern and southern sites. Distinct clustering of moderate to moderately-well sorted sediments in northern and southern sites implies that the majority of sites in both regions have been reworked by similar processes; most likely normal beach processes (Fig. 19). This strongly suggests that the 2004 tsunami entrained locally available sediment. The northern sites had lower inundation values and tsunami deposit thicknesses than the southern sites (Figures 2, 12). One of the main causes of these variations in the inundation and

deposit thickness was the prominent seaward beach ridge at many of the northern sites that was only present at Vilundamavadi and Kallar in the southern region.

5) Sediment deposited by the December 26, 2004 tsunami was relatively unchanged 3 years after the event (February, 2008). However, bioturbation and the high level of human activity near the coastline and the lack of clearly defined grain size parameters may result in identification problems of the in situ field identifiers such as mafic mineral laminations and an erosional, hummocky lower boundary, if they are destroyed or altered.
6) The Mastersizer 2000 laser particle size analyzer produced similar results to the wet sieve method. The main difference occurred in samples containing substantial (20%) mafic minerals which were elongated and tended to measure around 0.25φ finer in wet sieve analysis relative to the laser diffraction analysis.
7) The complex nature and relatively poor understanding of southeastern Indian coastal processes necessitates further study that would focus on dating ancient inland beach ridges to better constrain how the shoreline evolved in the Holocene. This information could then better direct future studies toward potential paleotsunami preservation sites, based on the modern examples of tsunami deposits at Mamallapuram, Thiruvadandhai, Kallar and Vilundamavadi.
8) The Holocene sediment history of the southeastern coast of India is highly variable, with Mamallapuram being nearly 2.3 kya old within 200 meters of the current mean swash zone and nearby Thiruvadandhai being only 100 years old within 200 meters of the current mean swash zone in similar geomorphic

environments. These differences in age could be related to zones of erosion, stability or progradation. The younger OSL ages from Thiruvadandhai, Kallar, Aalikuppam and Vilundamavadi indicate a relatively high rate of sedimentation near the shoreline and points toward the possibility that the swales behind the landward beach ridges at these sites might preserve evidence of the last large tsunami event between 1000-1300 years ago (Rajendran et al., 2013). Dating coastal and landward beach ridges along the coast could help determine the timing and existence of depositional environments with the potential for the preservation and identification of paleotsunami deposits.

Summary

The southeastern coast of India contains environments with preservation potential and sufficient age to capture the documented paleotsunami deposits from around the Indian Ocean basin. We recommend searching in the swales immediately behind the landward beach ridges for evidence of ancient fans. While it would be difficult to distinguish sedimentologically or geomorphologically whether a fan is from a paleotsunami or a past cyclone, ages that correlate with paleotsunami deposits from across the Indian Ocean basin would provide supporting evidence of the recurrence interval of large tsunamis that affect the Indian coastline.

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APPENDICES

Appendix A

Stratigraphic Descriptions

The stratigraphic columns in Appendix A are in order from north to south as shown on Figure 2 and listed in Table 1.

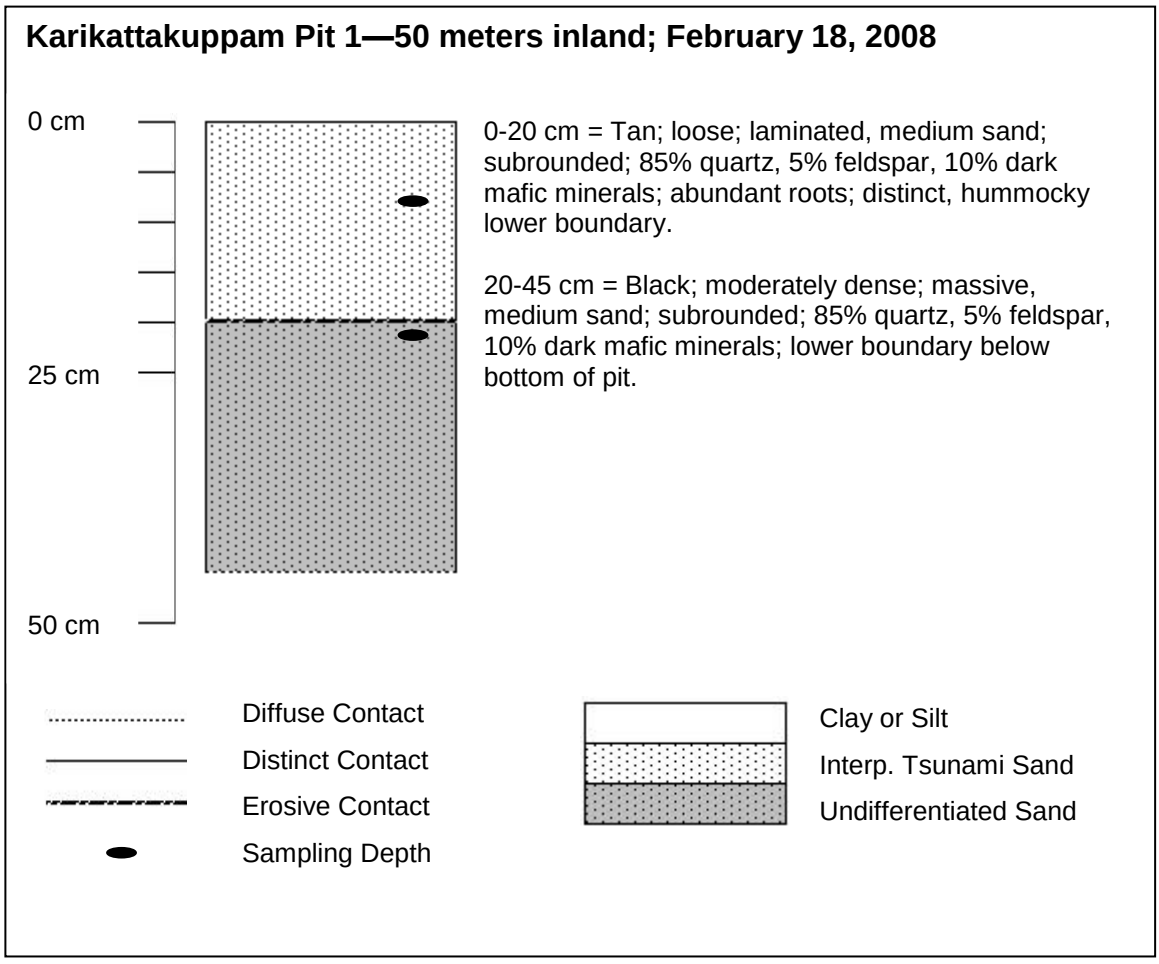


Figure A1. Stratigraphic column and description of Karikattakuppam Pit 1

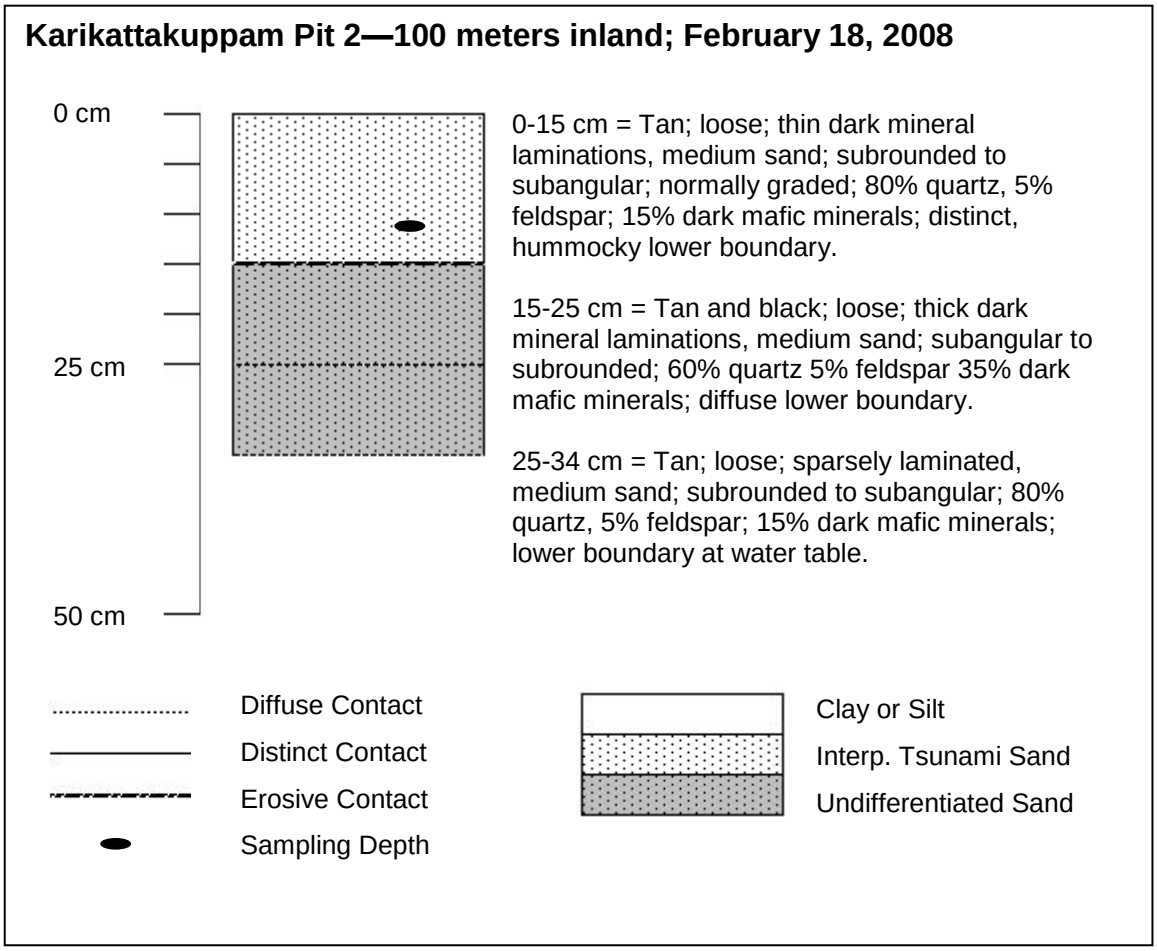


Figure A2. Stratigraphic column and description of Karikattakuppam Pit 2

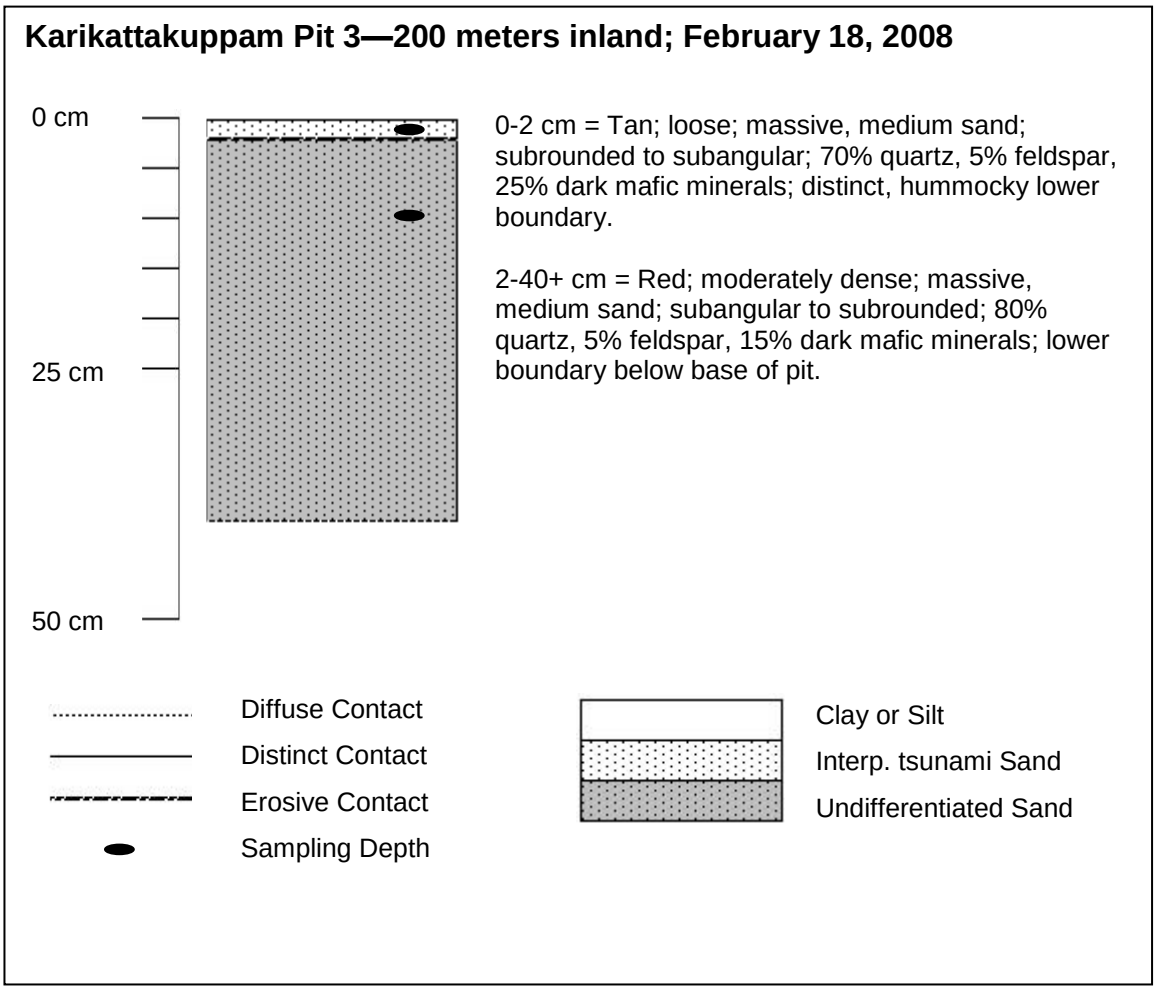


Figure A3. Stratigraphic column and description of Karikattakuppam Pit 3

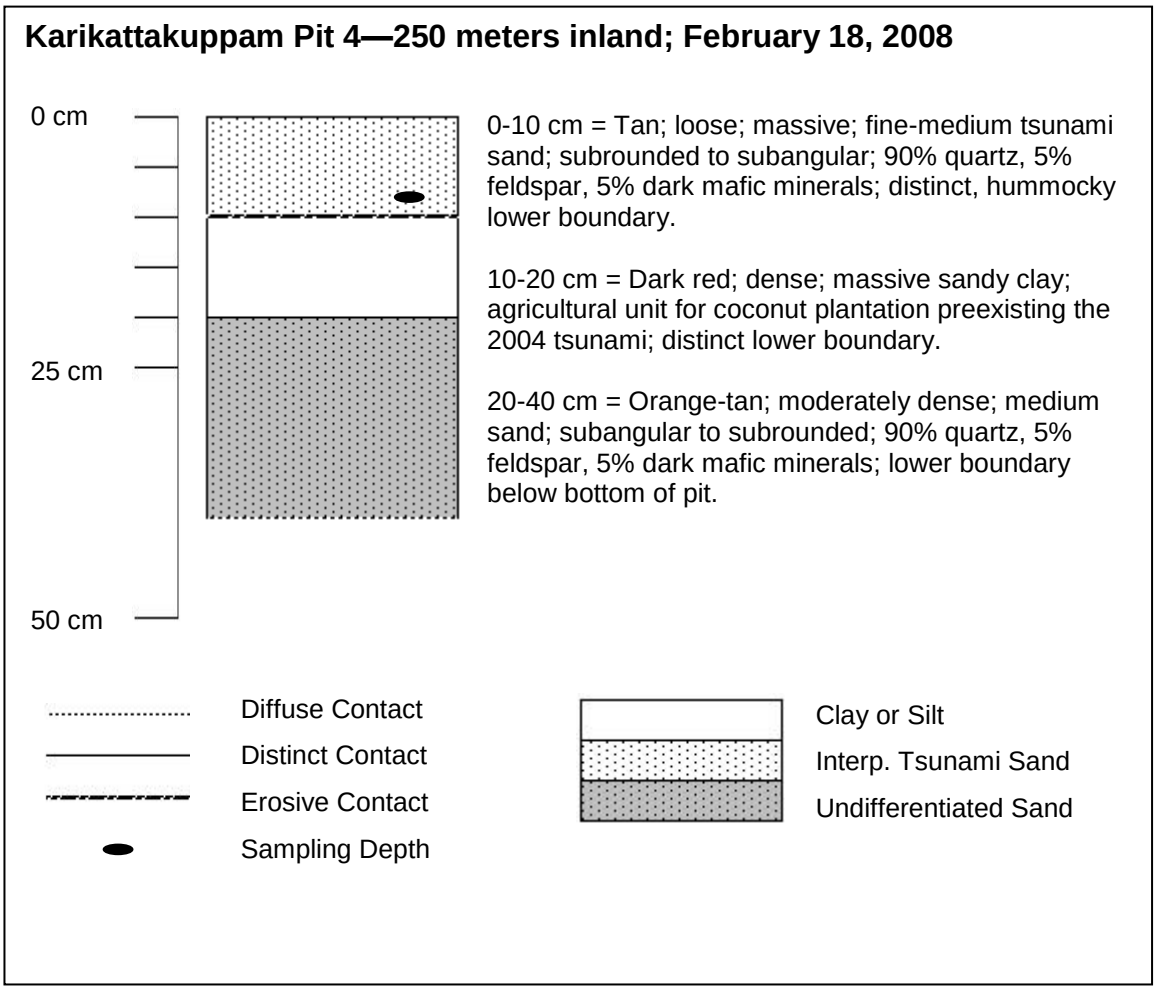
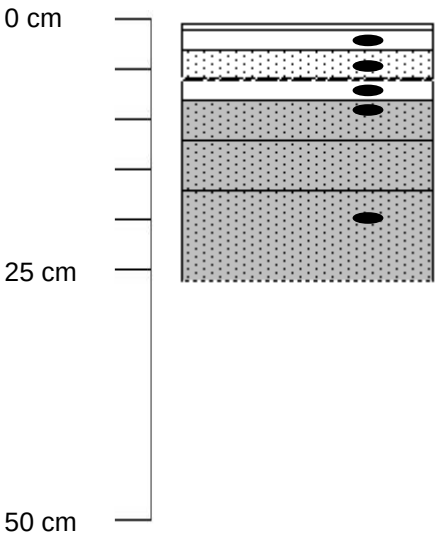


Figure A4. Stratigraphic column and description of Karikattakuppam Pit 4

Muttukaddu Pit 1—1500 meters inland; February 18, 2008



0-0.5 cm = White-tan; moderately dense; massive; silt; distinct lower boundary.

0.5-2.5 = Brown; moderately dense; mottled silt; distinct lower boundary.

2.5-5.5 cm = Tan; moderately dense; faint dark mineral laminations; fine tsunami sand; subrounded; 90% quartz, 5% feldspar, 5% dark mafic minerals; distinct, hummocky lower boundary.

5.5-7.5 cm = Dark gray; moderately dense; massive; silt; distinct lower boundary.

7.5-11 cm = Tan; moderately dense; massive; medium sand; subrounded, occ subangular, 90% quartz, 5% feldspar, 5% dark mafic minerals; distinct lower boundary.

11-16 cm = Gray; moderately dense; massive; fine sand; subrounded, occ subangular, 90% quartz, 5% feldspar, 5% dark mafic minerals; distinct lower boundary.

16-25+ cm = Red-gray; moderately dense; heavily mottled, fine-medium sand; 90% quartz, 5% feldspar, 5% dark mafic minerals; lower boundary at water table.

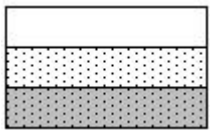
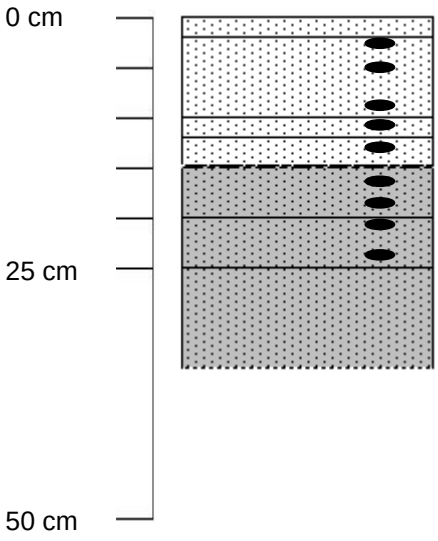


Figure A5. Stratigraphic column and description of Muttukaddu Pit 1

Kovalam Pit 1—40 meters inland; February 12, 2008



0-2 cm = Tan; moderately dense; massive; medium tsunami sand; subrounded to subangular; 90% quartz, 5% feldspar, 5% dark mafic minerals; contains numerous grass roots; distinct lower boundary

2-10 cm = Tan; loose; thick dark mineral laminations; fine-medium tsunami sand; subrounded to subangular; 90% quartz, 5% feldspar, 5% dark mafic minerals; bioturbated; distinct hummocky lower boundary.

10-12 cm = Tan; loose; laminated; fine tsunami sand; subrounded, laminations are subangular; 60% quartz, 5% feldspar 35% dark mafic minerals; distinct lower boundary.

12-15 cm = Tan; loose; laminated; coarse tsunami sand; subangular, occasionally subrounded; 70% quartz, 5% feldspar, 25% dark mafic minerals; inversely graded; distinct lower boundary.

15-20 cm = Tan-brown; loose; massive; medium sand; subrounded to subangular; 90% quartz, 5% feldspar, 5% dark mafic minerals; normally graded; distinct lower boundary.

20-25 cm = Red-tan; loose; massive; medium-coarse sand; subangular to subrounded; 90% quartz, 5% feldspar, 5% dark mafic minerals; mottled; gradational lower boundary.

25-35 cm = Gray-brown; loose; massive; medium-coarse sand; subrounded to subangular; 90% quartz, 5% feldspar, 5% dark mafic minerals; distinct lower boundary at local water table.

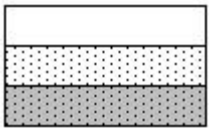


Figure A6. Stratigraphic column and description of Kovalam Pit 1

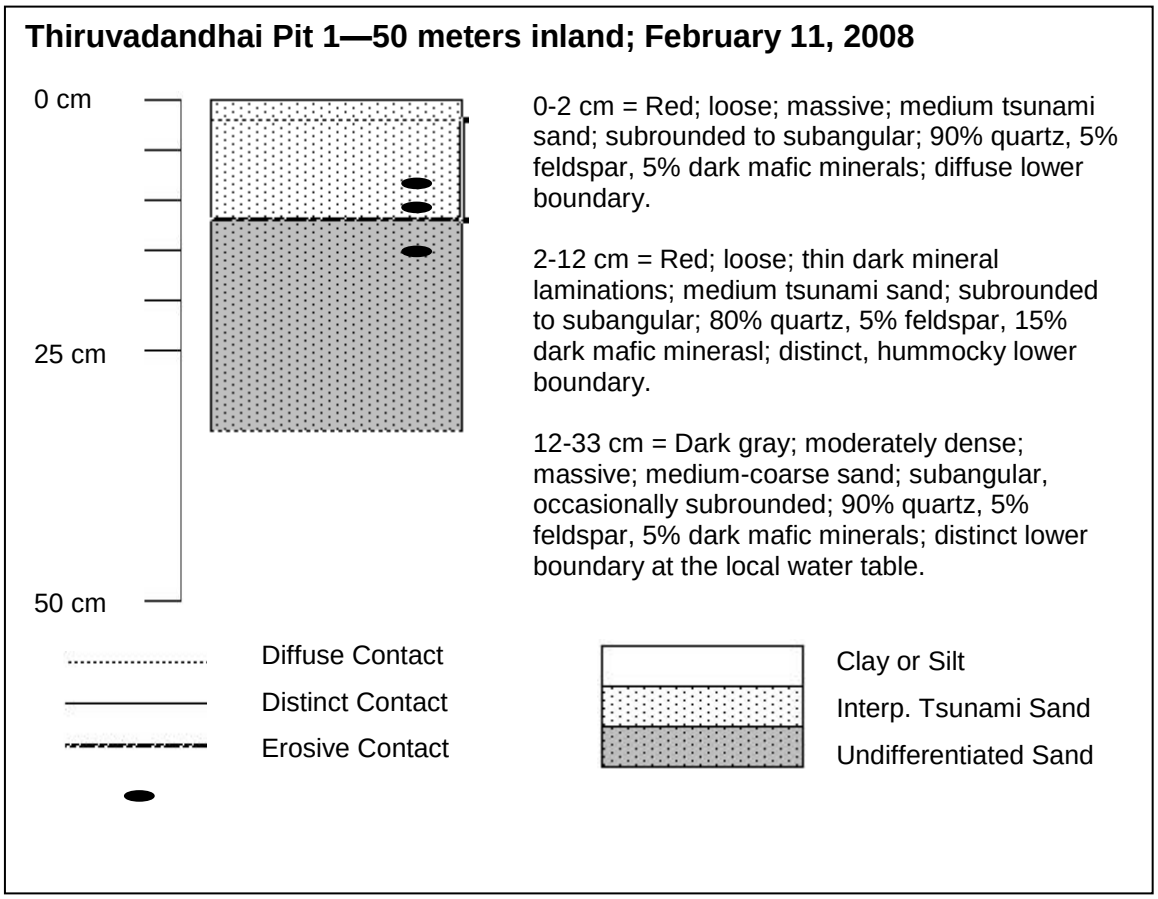
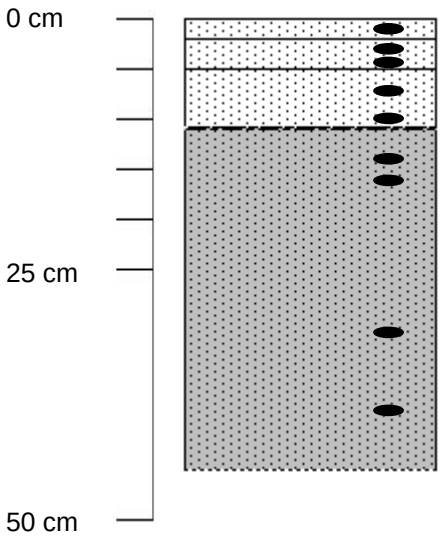


Figure A7. Stratigraphic column and description of Thiruvadandhai Pit 1

Thiruvadandhai Pit 2—100 meters inland; February 11, 2008



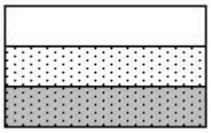
0-2 cm = Red-white; moderately dense; massive; medium tsunami sand; subrounded to subangular; 90% quartz, 5% feldspar, 5% dark mafic minerals; contains roots; diffuse lower boundary.

2-5 cm = Red-orange; loose; faintly laminated; medium tsunami sand; subrounded to subangular; 85% quartz, 5% feldspar, 10% dark mafic minerals; diffuse lower boundary.

5-11 cm = Black; moderately dense; massive; medium tsunami sand; subrounded to subangular; 80% quartz, 5% feldspar, 15% dark mafic minerals; contains numberous organic material that stains this layer black; distinct, hummocky lower boundary.

11-45 cm = Gray; moderately dense; massive; medium-coarse sand; subangular, occasionally subrounded, 90% quartz, 5% feldspar, 5% dark mafic minerals; distinct lower boundary at the local water table.

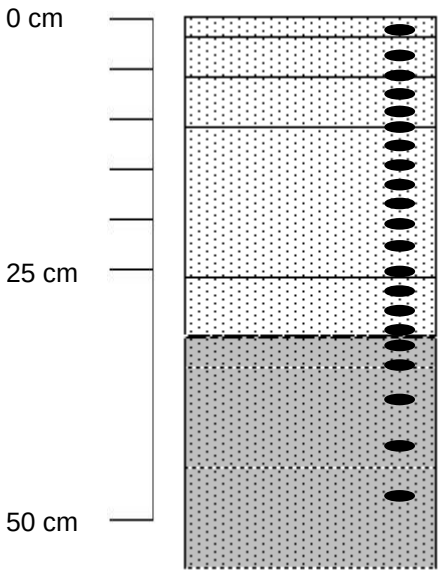
Diffuse Contact
Distinct Contact
Erosive Contact
Sampling Depth



Clay or Silt
Interp. Tsunami Sand
Undifferentiated Sand

Figure A8. Stratigraphic column and description of Thiruvadandhai Pit 2

Thiruvadandhai Pit 3—150 meters inland; February 11, 2008



0-2 cm = Red-tan; moderately dense; massive; coarse tsunami sand; subangular, occasionally subrounded; 90% quartz, 5% feldspar, 5% dark mafic minerals; numerous roots; distinct lower boundary.

2-6 cm = Tan; loose; numerous thin dark mineral laminations; fine tsunami sand; subrounded, occasionally subangular; 65% quartz, 5% feldspar, 30% dark mafic minerals; djstinct lower boundary.

6-11 cm = Tan; loose; massive; thin dark mineral laminations; medium-coarse tsunami sand; subrounded to subangular; 80% quartz, 5% feldspar, 15% dark mafic minerals;distinct lower boundary.

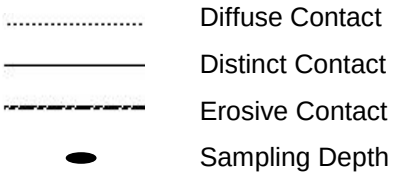
11-26 cm = Tan; loose; massive; medium-coarse tsunami sand; subangular to subrounded; 90% quartz, 5% feldspar, 5% dark mafic minerals; distinct lower bondary.

26-32 cm = Red; loose; thin dark mineral laminations; medium tsunami sand; subrounded to subangular; 80% quartz, 5% feldspar, 15% dark mafic minerals; distinct, hummocky lower boundary.

32-35 cm = Black; moderately dense; massive medium sand; subangular to subrounded; 85% quartz, 5% feldspar, 15% dark mafic minerals; diffuse lower boundary.

35-45 cm = Red; moderately dense; massive; mottled; medium-coarse sand; subangular, occasionally subrounded; 90% quartz, 5% feldspar, 5% dark mafic minerals; undulatory diffuse lower boundary.

45-55 cm = Gray; moderately dense; massive; mottled; medium coarse sand; subangular, occasionally subrounded; 90% quartz, 5% feldspar, 5% dark mafic minerals; distinct lower boundary at local water table.



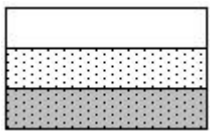


Figure A9. Stratigraphic column and description of Thiruvadandhai Pit 3

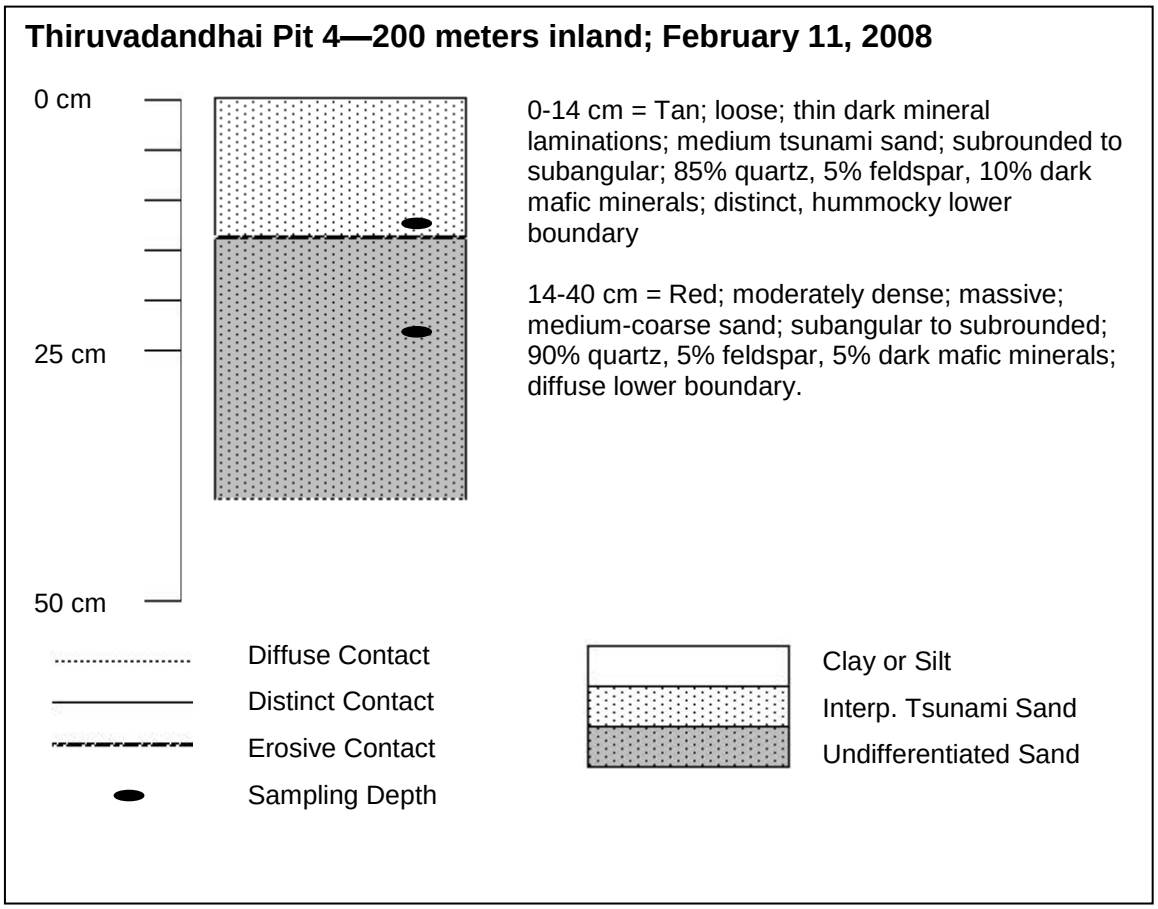


Figure A10. Stratigraphic column and description of Thiruvadandhai Pit 4

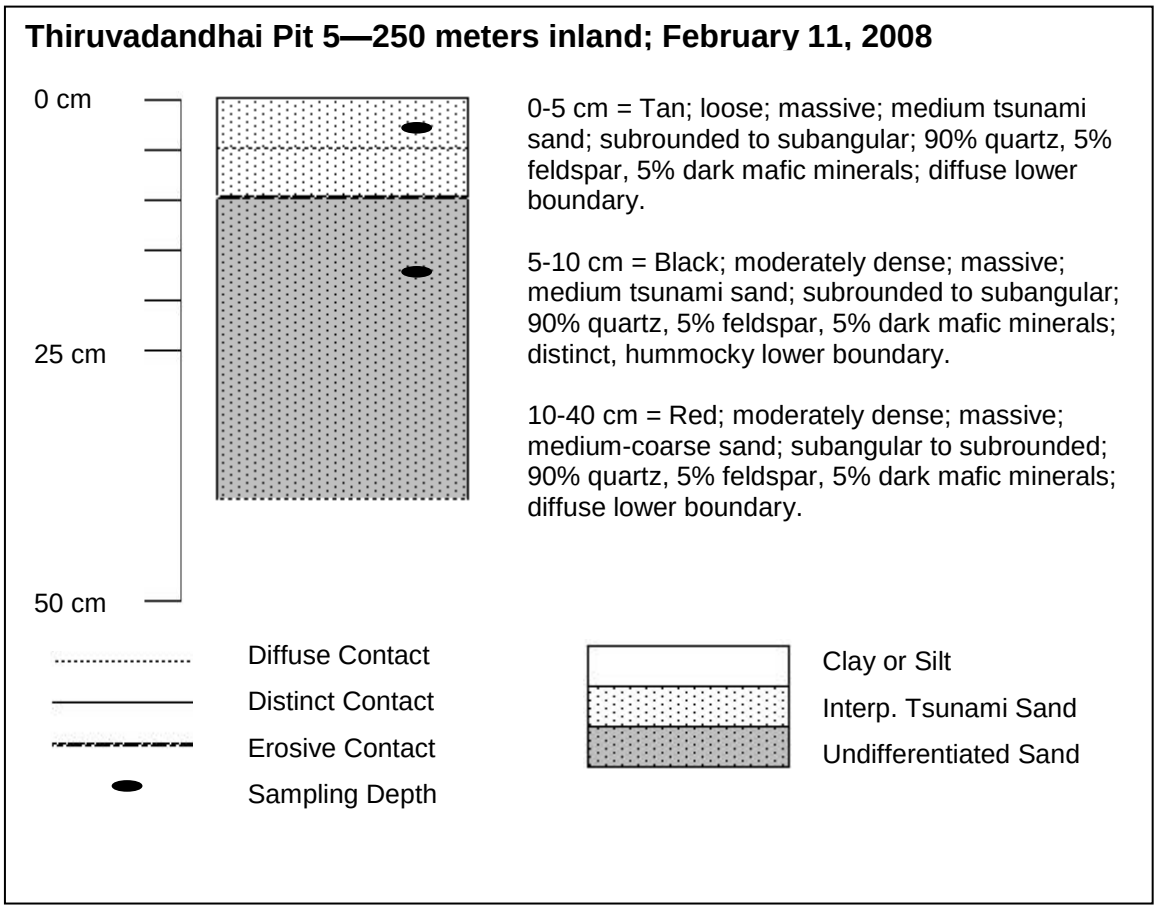


Figure A11. Stratigraphic column and description of Thiruvadandhai Pit 5

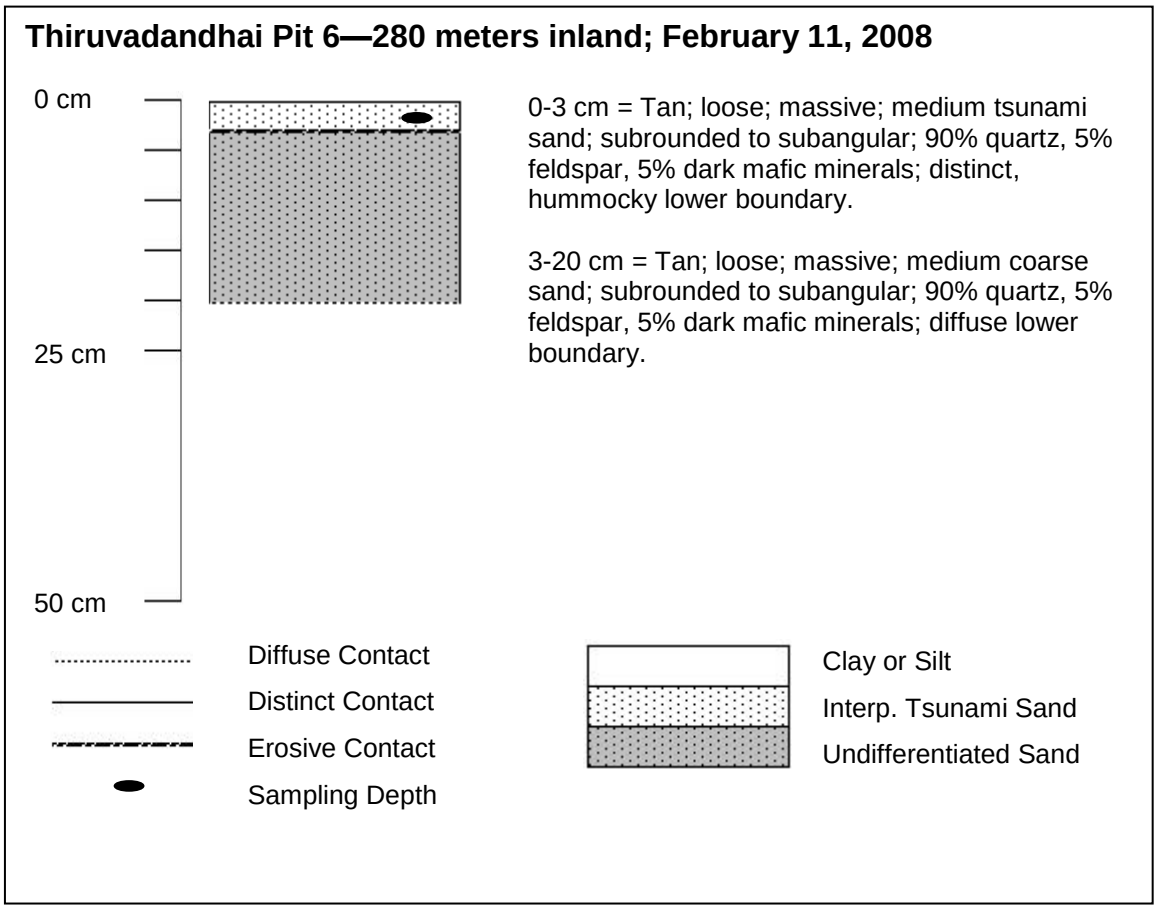


Figure A12. Stratigraphic column and description of Thiruvadandhai Pit 6

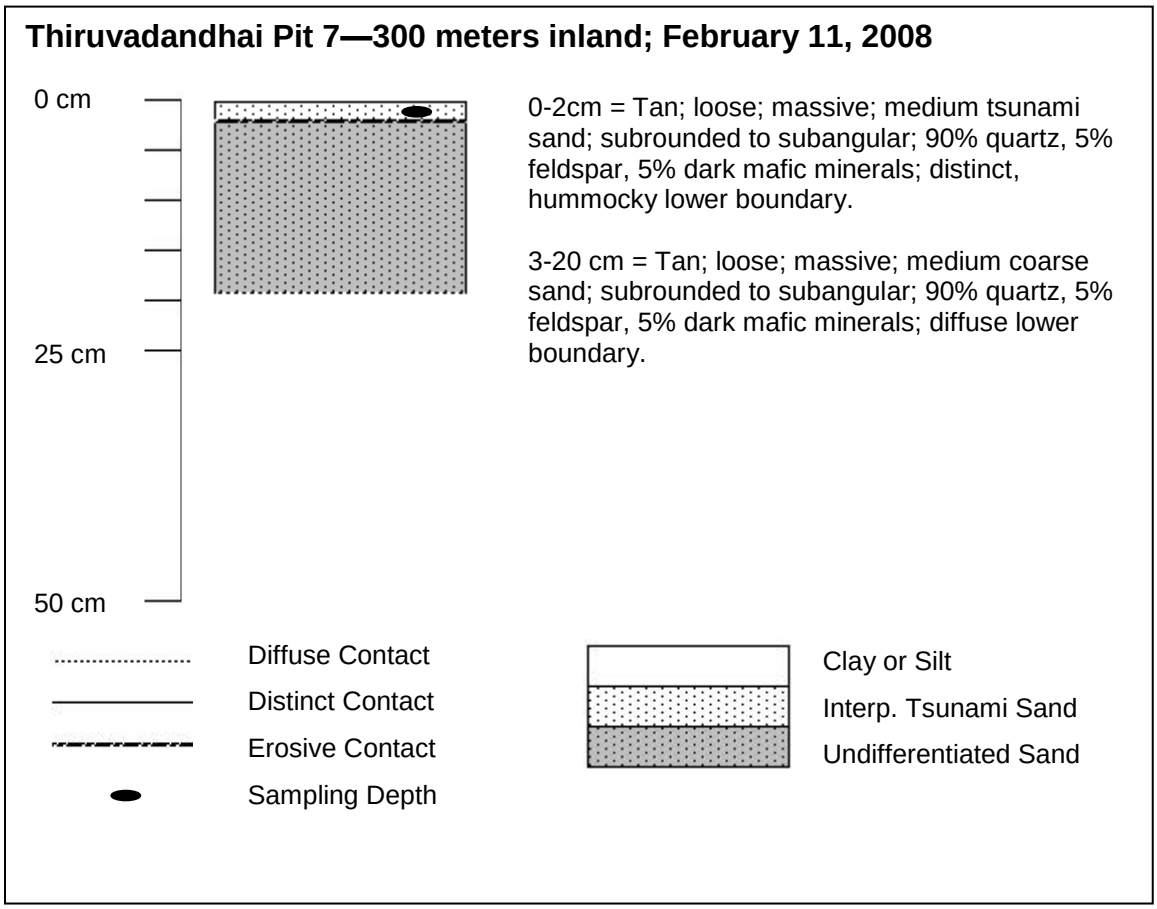
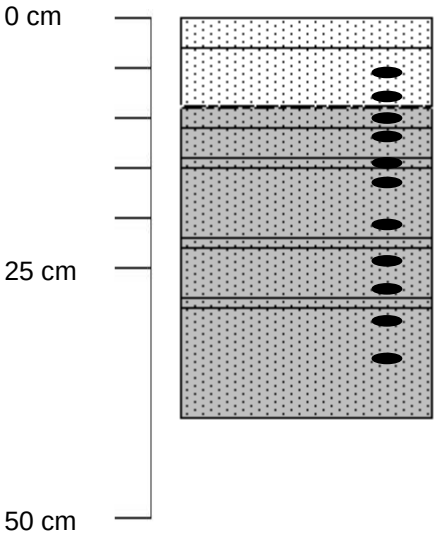
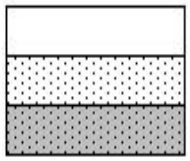


Figure A13. Stratigraphic column and description of Thiruvadandhai Pit 7

Vadanemelli Pit 1—100 meters inland; February 16, 2008





Clay or Silt

Interp. Tsunami Sand

Undifferentiated Sand

Diffuse Contact

Distinct Contact

Erosive Contact

Sampling Depth

0-3 cm = Black; moderately dense; massive; fine-medium tsunami sand; subrounded to subangular; 90% quartz, 5% feldspar, 5% dark mafic minerals; contains abundant organic material and roots; distinct, lower boundary.

3-9 cm = Tan; loose; thin dark mineral laminations; fine-medium tsunami sand; subrounded to subangular; 85% quartz, 5% felspar; 10% dark mafic minerals; distinct. hummocky lower boundary.

9-11 cm = Black; moderately dense; massive; medium sand; subrounded; 90% quartz, 5% feldspar, 5% dark mafic minerals; abundant organic debris; distinct lower boundary.

11-14 cm = Red-tan; loose; massive; medium-coarse; sand; subangular, occasionally subrounded, 90% quartz, 5% feldspar, 5% dark mafic minerals; distinct lower boundary.

14-15 cm = Black; moderately dense; massive; medium sand; subangular; 90% quartz, 5% feldspar, 5% dark mafic minerals; abundant organic material; distinct lower boundary.

15-22 cm = Gray; loose; massive; medium-coarse; sand; subangular, occasionally subrounded, 90% quartz, 5% feldspar, 5% dark mafic minerals; distinct lower boundary.

22-23 cm = Black; loose; massive; medium sand; subangular to subrounded; 90% quartz, 10% dark mafic minerals; abundant organic material; distinct lower boundary.

23-28 cm = Gray; loose; massive; medium-coarse; sand; subangular, occasionally subrounded, 90% quartz, 5% feldspar, 5% dark mafic minerals; distinct lower boundary.

28-29 cm = Black; moderately dense; massive; medium sand; subrounded; 90% quartz, 5% feldspar, 5% dark mafic minerals; abundant organic material; distinct lower boundary.

29-40 cm = Gray; loose; massive; medium-coarse; sand; subangular, occasionally subrounded, 90% quartz, 5% feldspar, 5% dark mafic minerals; distinct lower boundary encounters local water table.

Figure A14. Stratigraphic column and description of Vadanemelli Pit 1

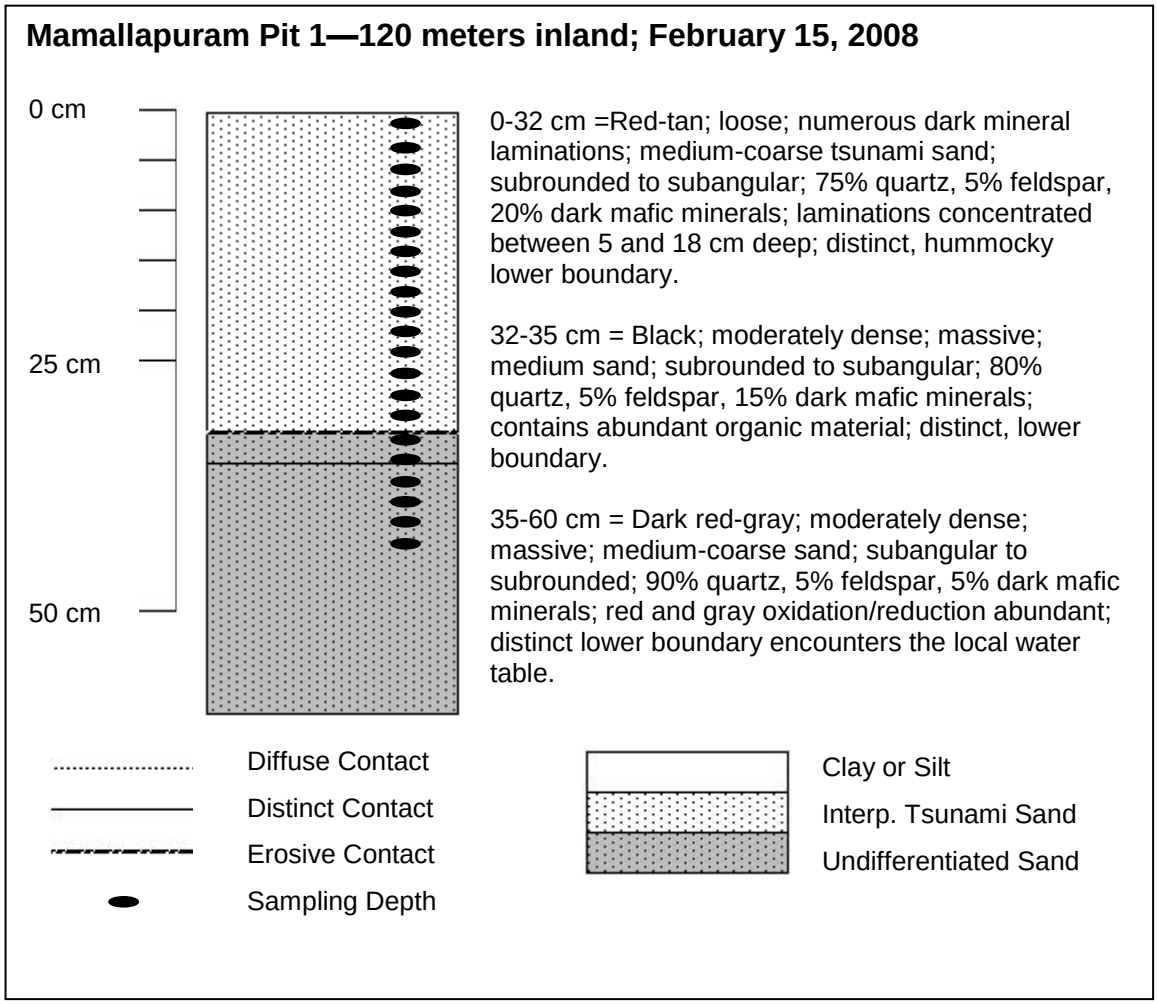


Figure A15. Stratigraphic column and description of Mamallapuram Pit 1

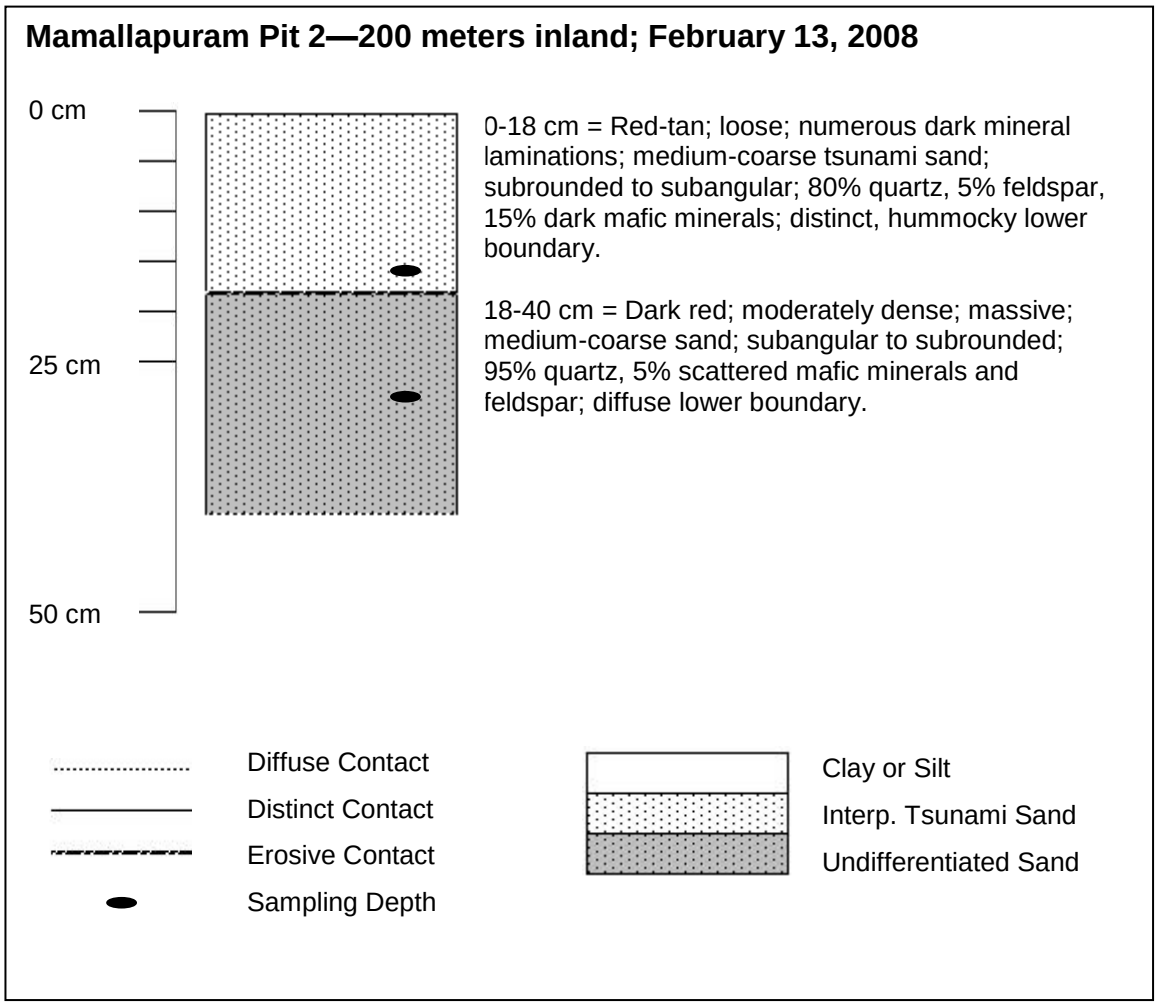


Figure A16. Stratigraphic column and description of Mamallapuram Pit 2

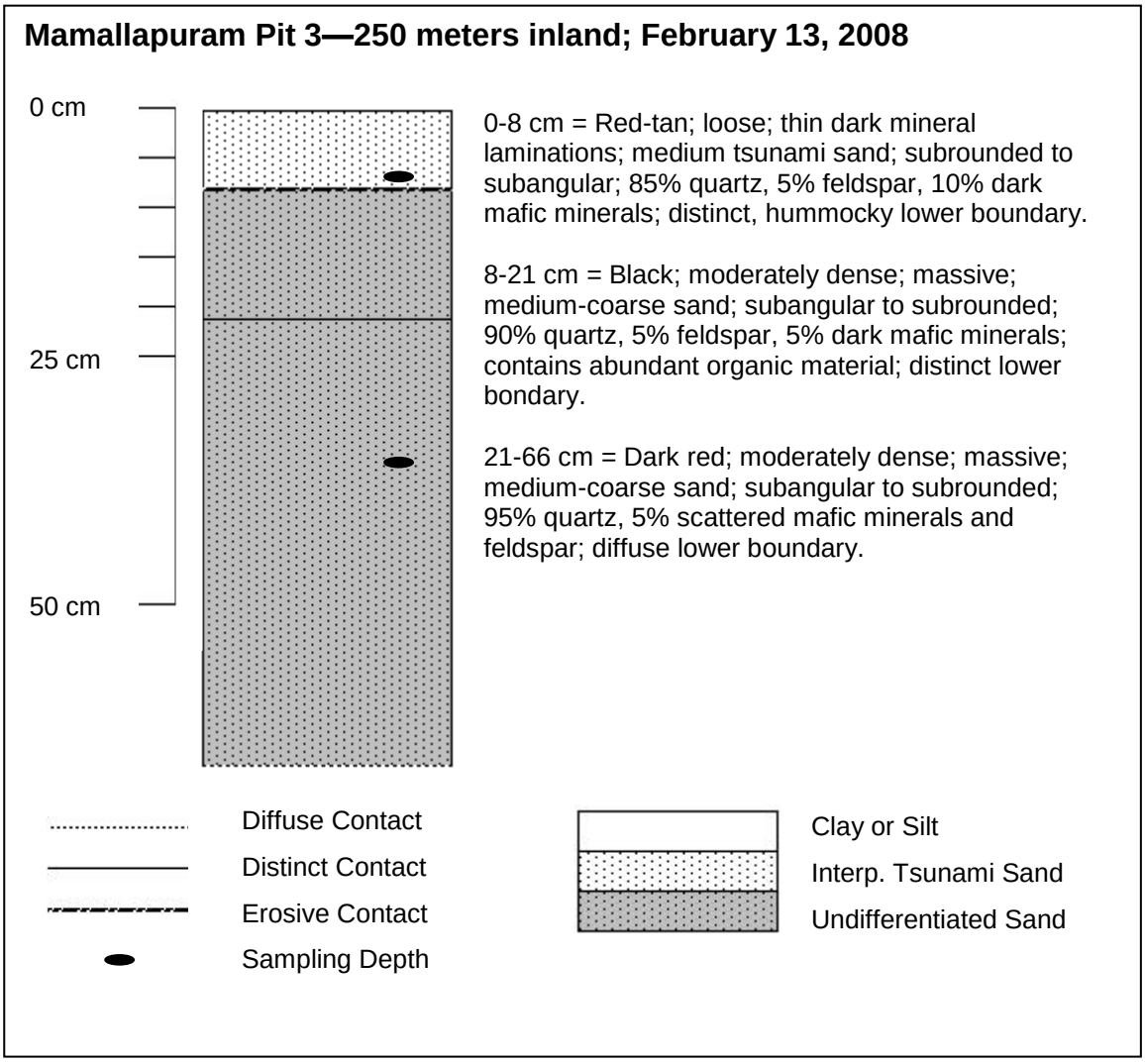


Figure A17. Stratigraphic column and description of Mamallapuram Pit 3

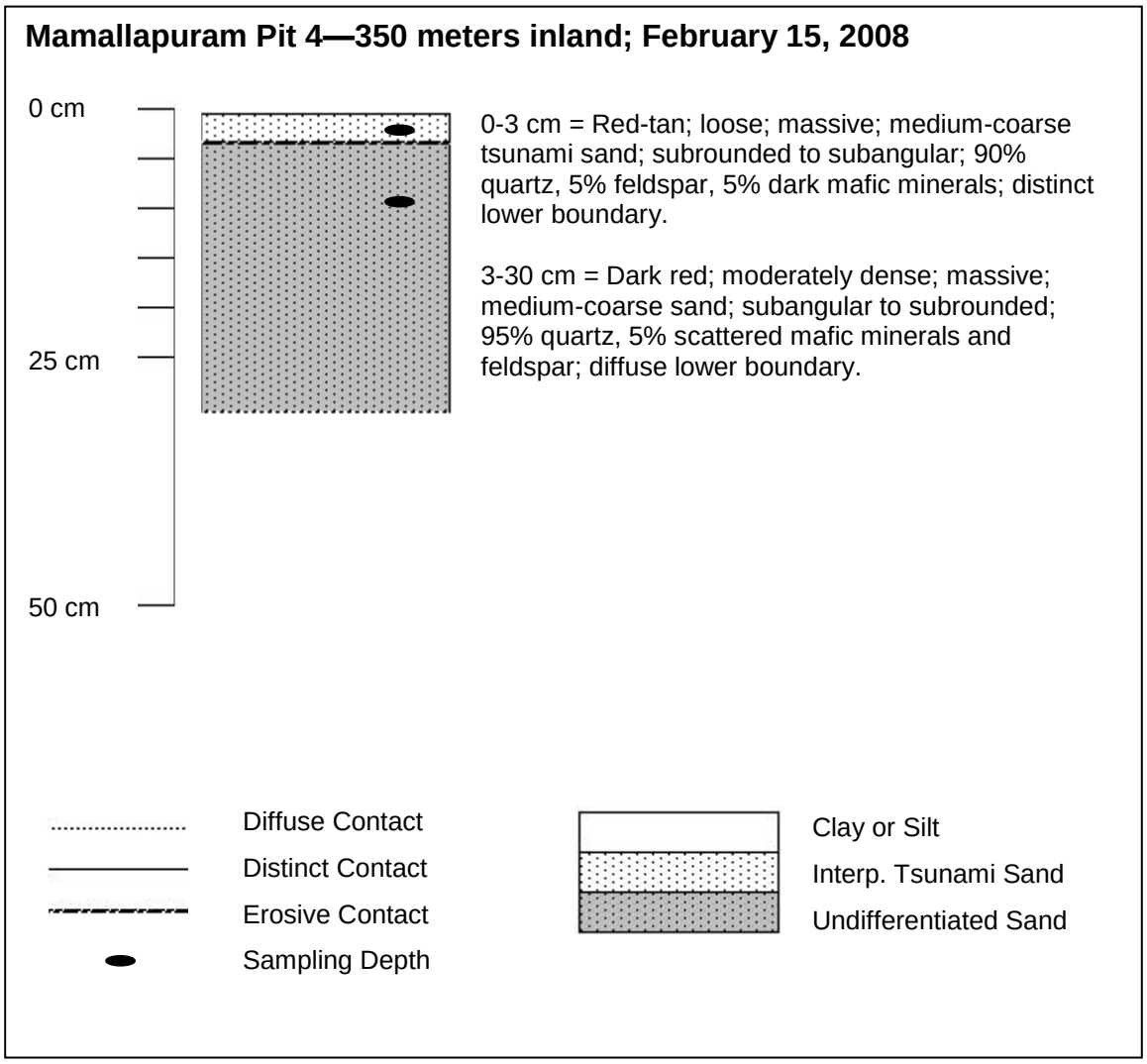


Figure A18. Stratigraphic column and description of Mamallapuram Pit 4

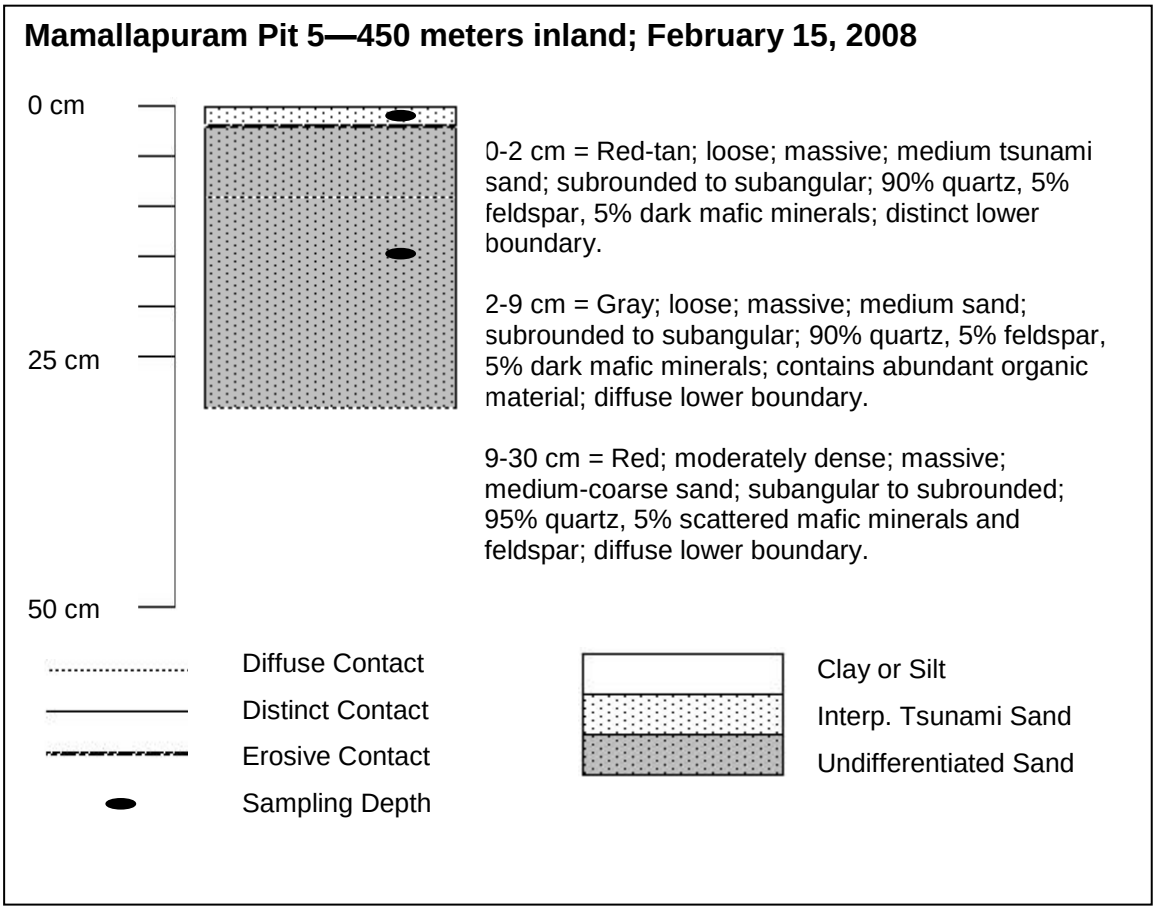


Figure A19. Stratigraphic column and description of Mamallapuram Pit 5

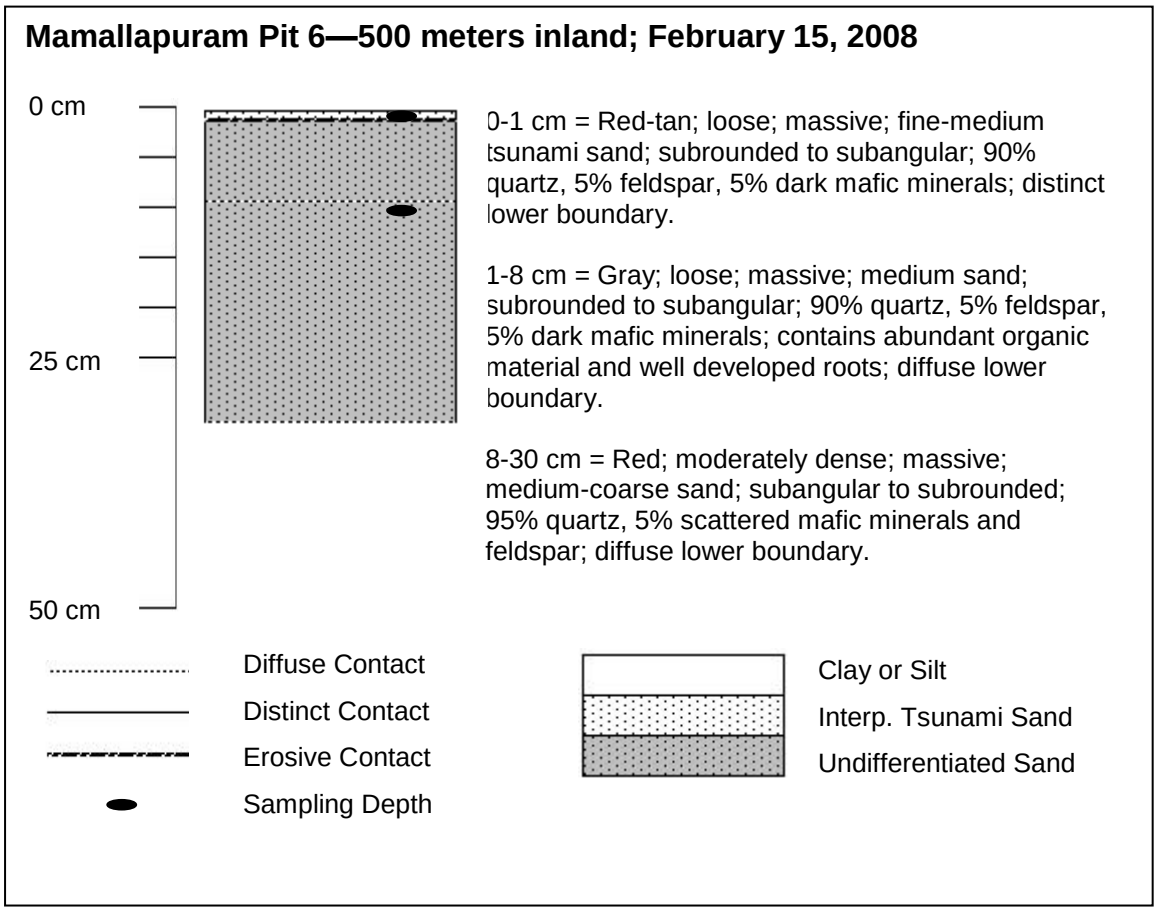
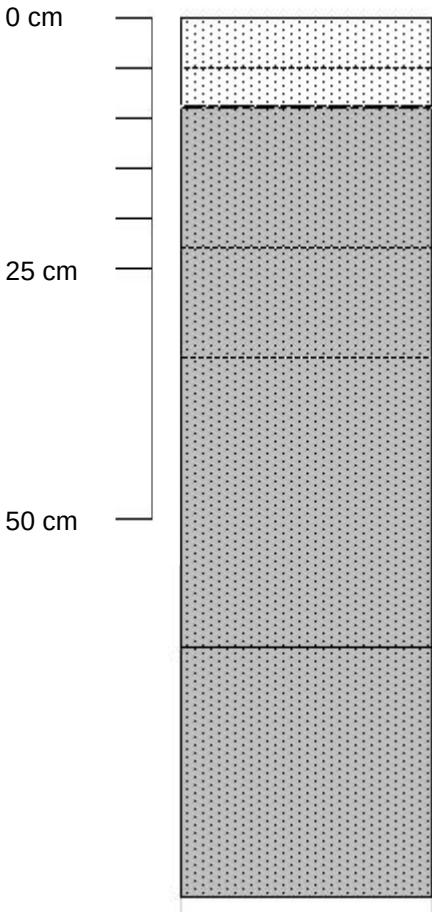


Figure A20. Stratigraphic column and description of Mamallapuram Pit 6

Aalikuppam Pit 1—150 meters inland; February 9, 2008



0-5 cm = Gray-tan; moderately dense; massive; medium-coarse tsunami sand; subrounded to subangular; 85% quartz, 10% feldspar, 5% dark mafic minerals; contains few roots; diffuse lower boundary.

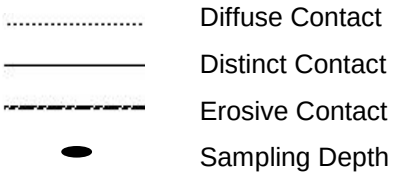
5-9 cm = Gray; loose; massive; medium tsunami sand; subrounded to subangular; 85% quartz, 10% feldspar, 5% dark mafic minerals; contains minor amounts of silt; distinct, hummocky lower boundary.

9-23 cm = Red-tan; moderately dense; massive; medium sand; subangular; 90% quartz, 5% feldspar, 5% dark mafic minerals; diffuse lower boundary.

23-34 cm = Red-tan; moderately dense; massive; medium-fine sand; subangular; 90% quartz, 5% feldspar, 5% dark mafic minerals; diffuse lower boundary.

34- 63 cm = Red-tan; moderately dense; massive; medium-coarse sand; subangular to subrounded; 90% quartz 5% feldspar, 5% dark mafic minerals; diffuse lower boundary.

63-88 cm = Gray; dense; weakly bedded; coarse sand; subangular; 80% quartz, 10% feldspar, 10% dark mafic minerals; lower boundary is the top of the local water table.



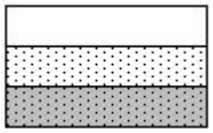


Figure A21. Stratigraphic column and description of Aalikuppam Pit 1

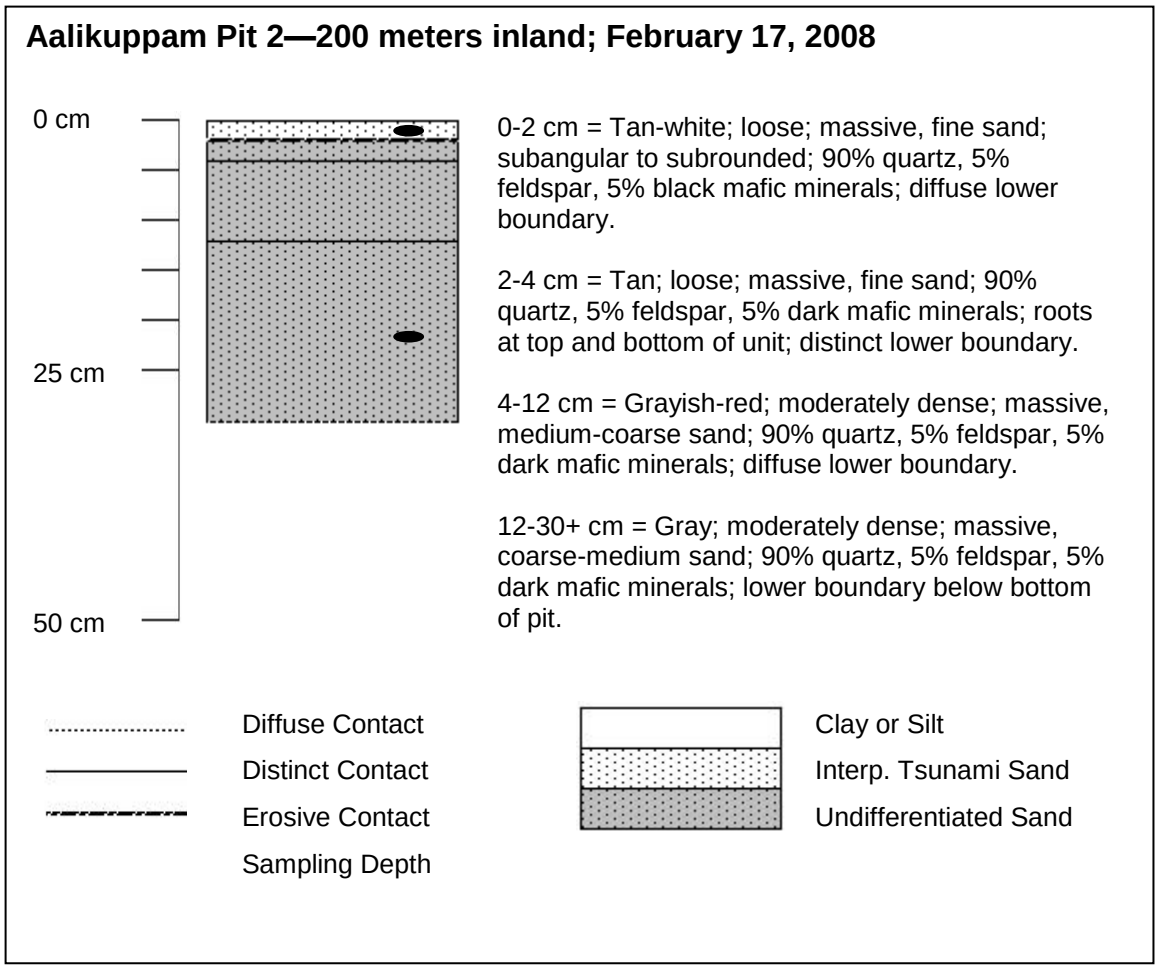


Figure A22. Stratigraphic column and description of Aalikuppam Pit 2

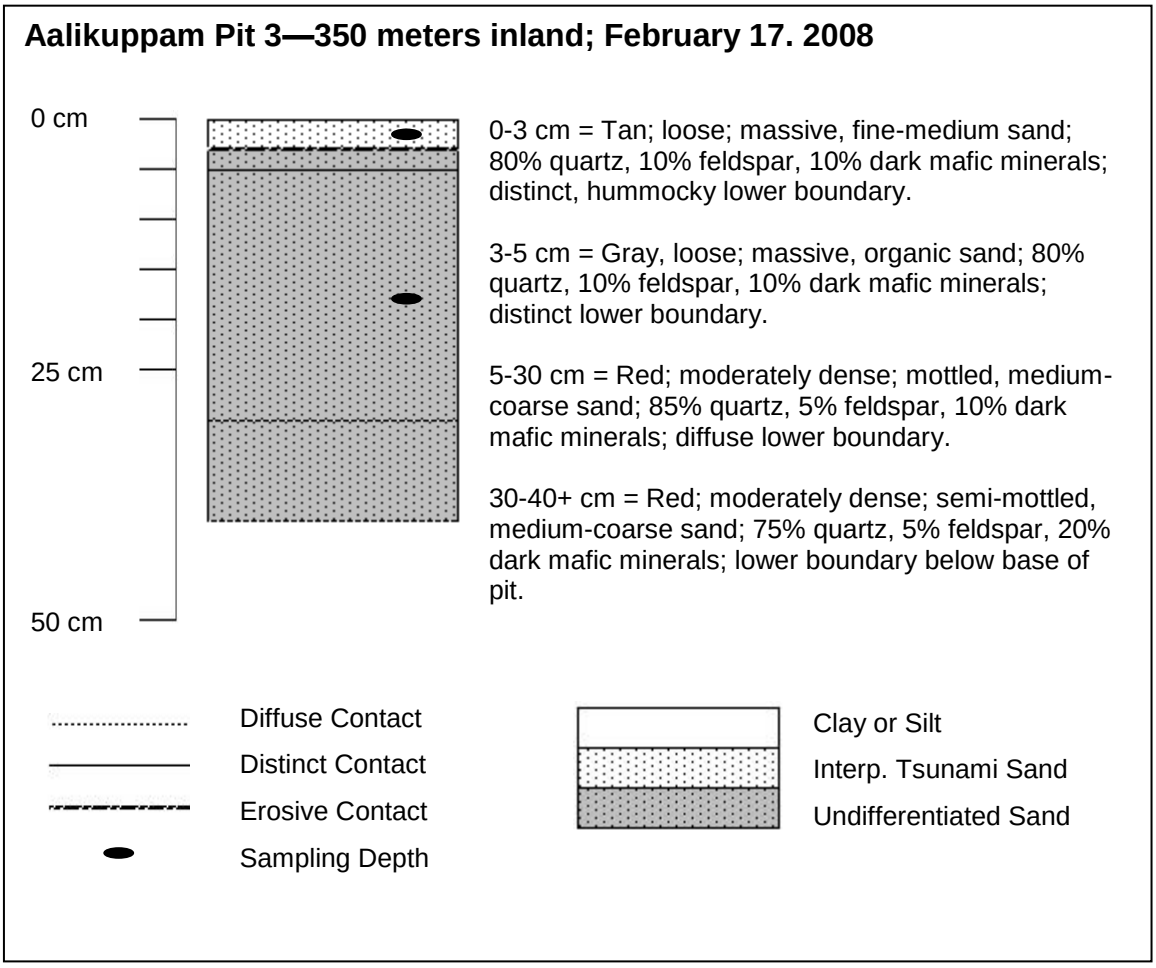


Figure A23. Stratigraphic column and description of Aalikuppam Pit 3

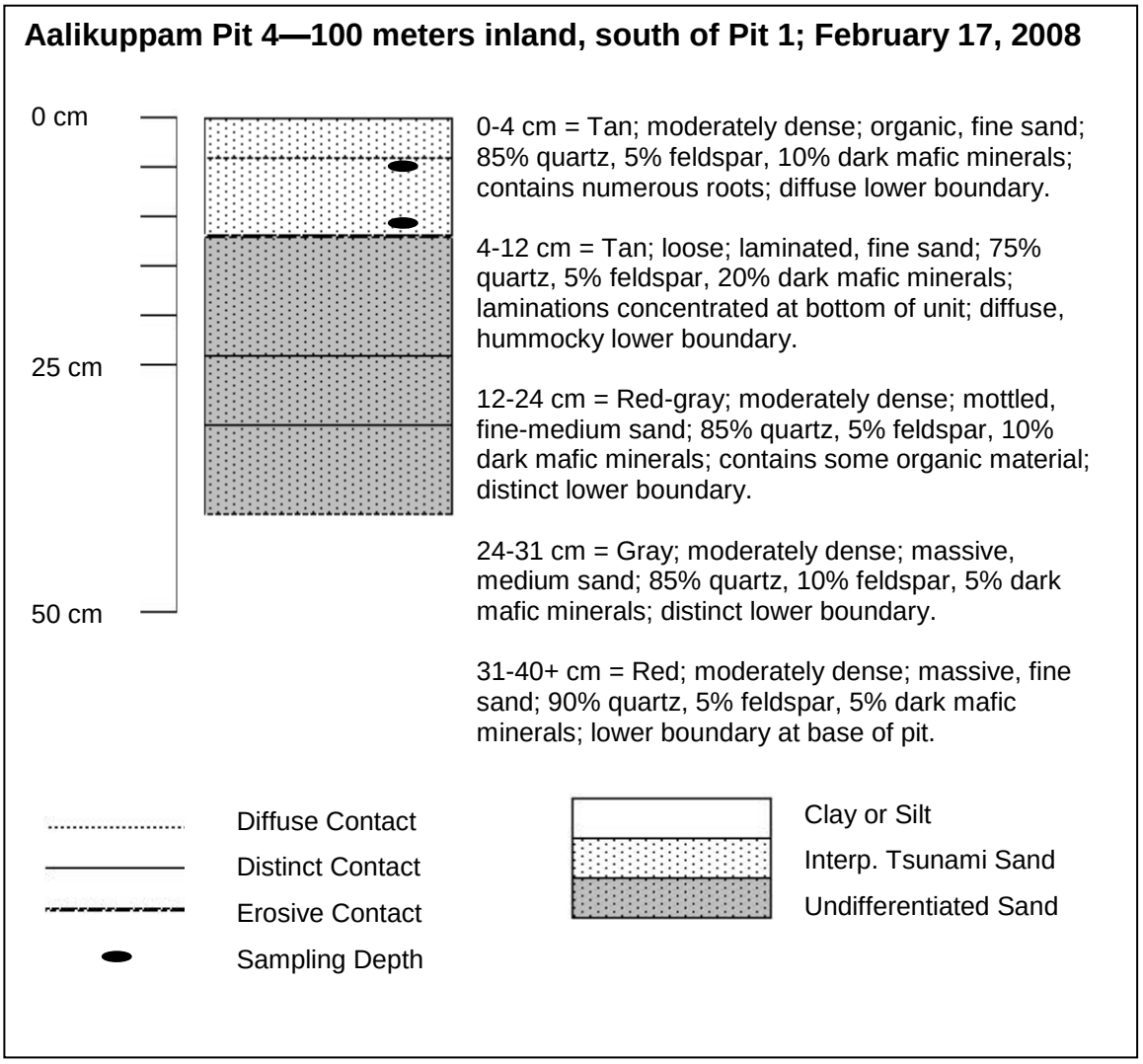


Figure A24. Stratigraphic column and description of Aalikuppam Pit 4

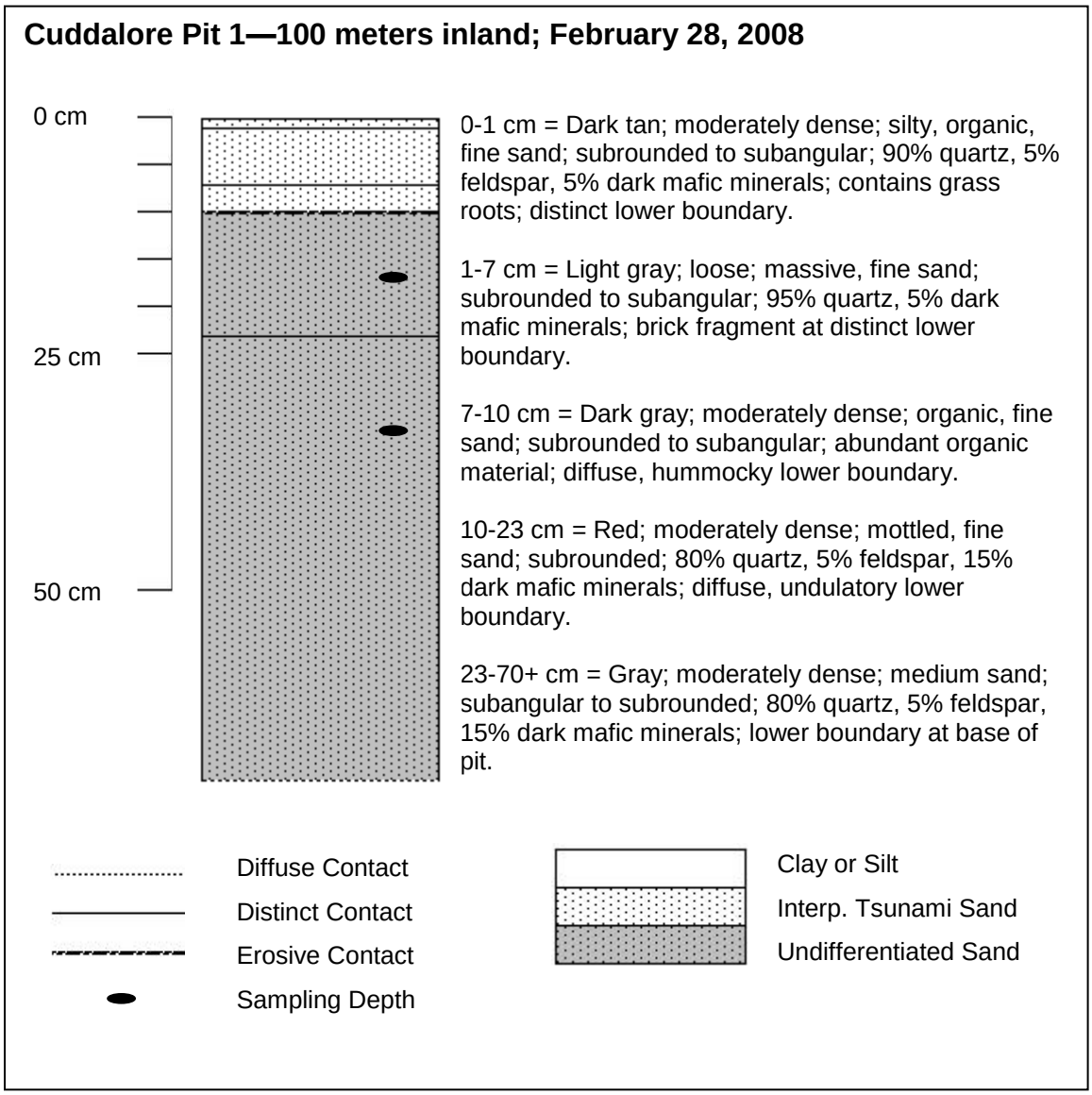


Figure A25. Stratigraphic column and description of Cuddalore Pit 1

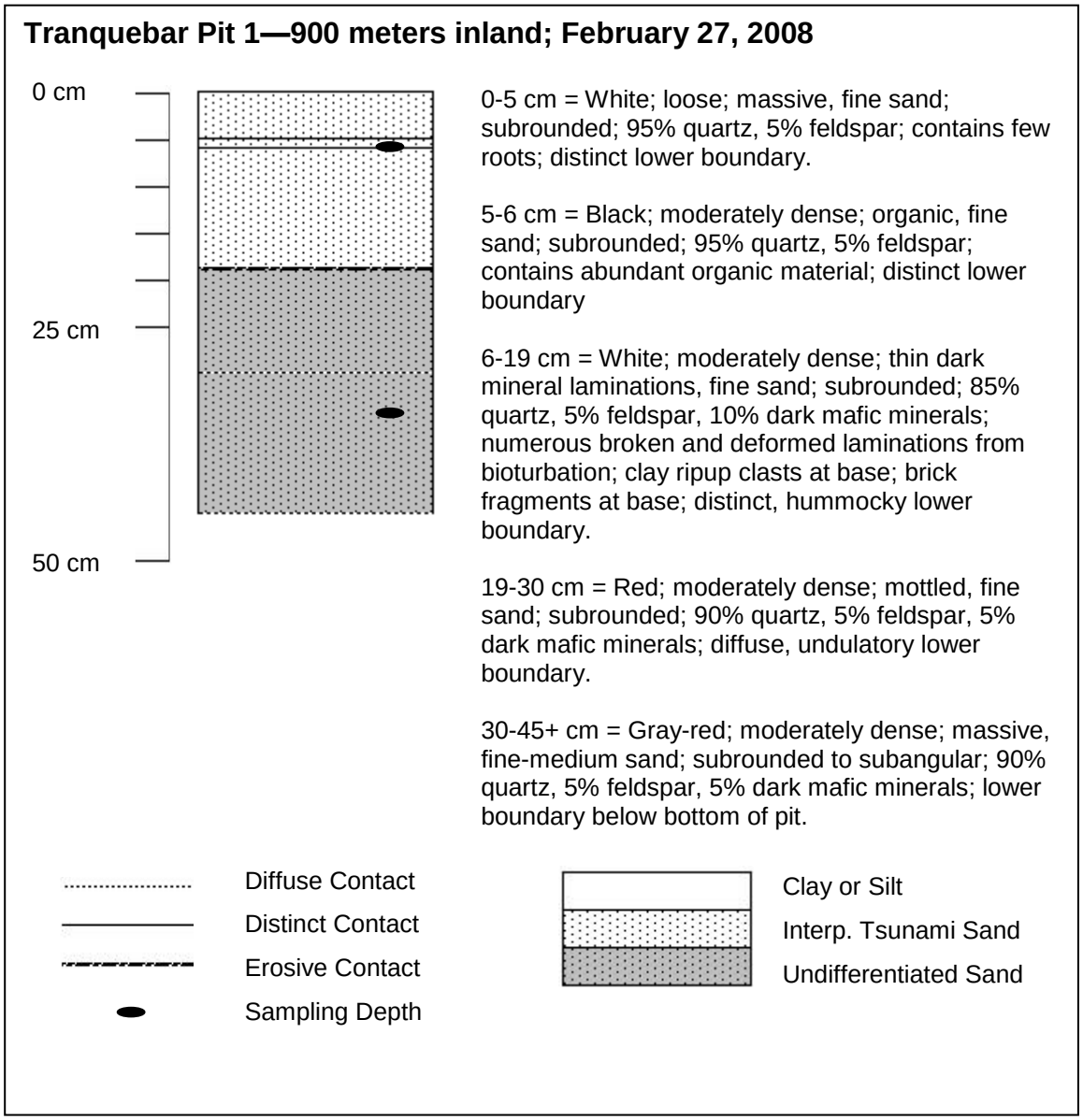


Figure A26. Stratigraphic column and description of Tranquebar Pit 1

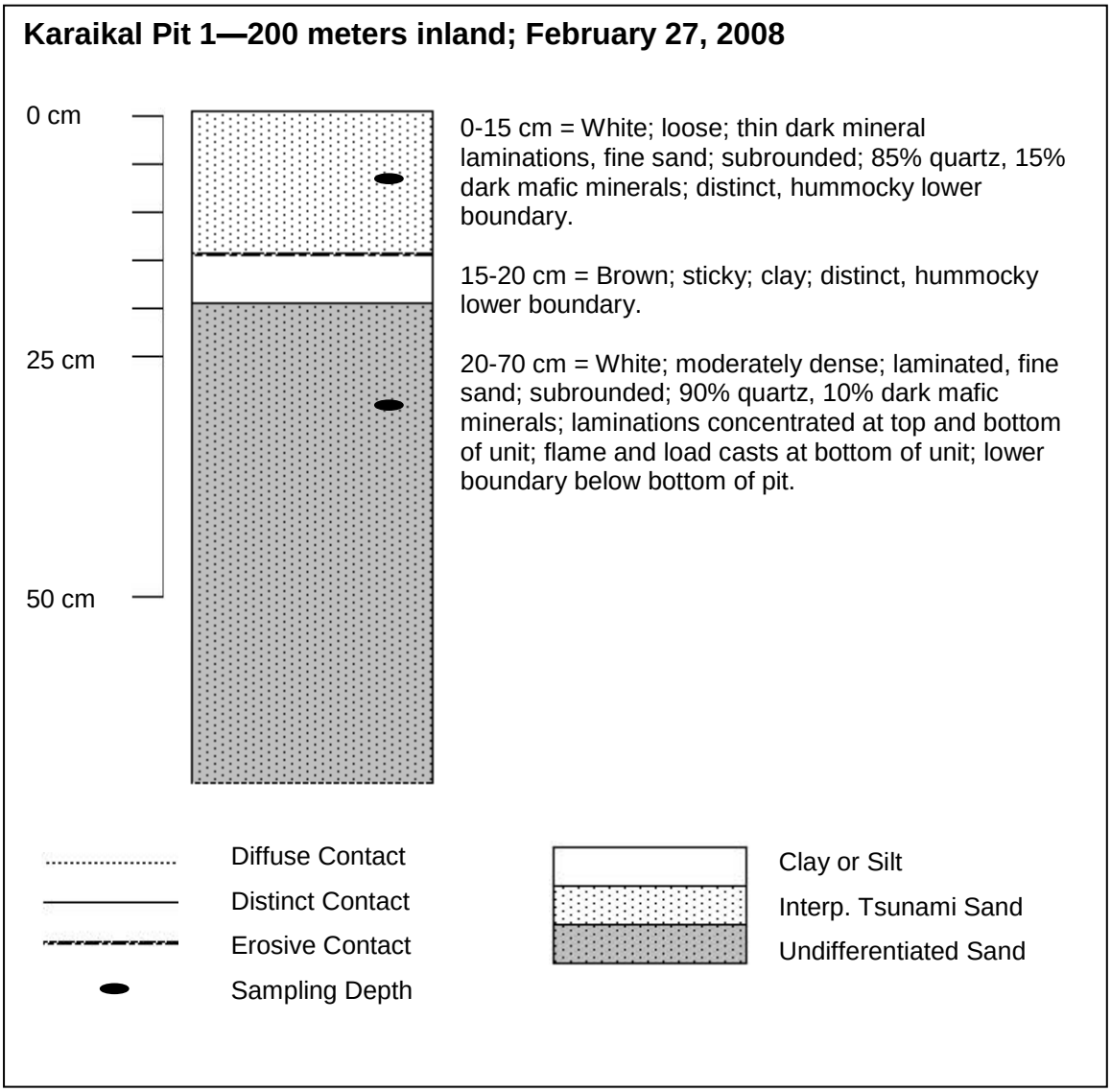


Figure A27. Stratigraphic column and description of Karaikal Pit 1

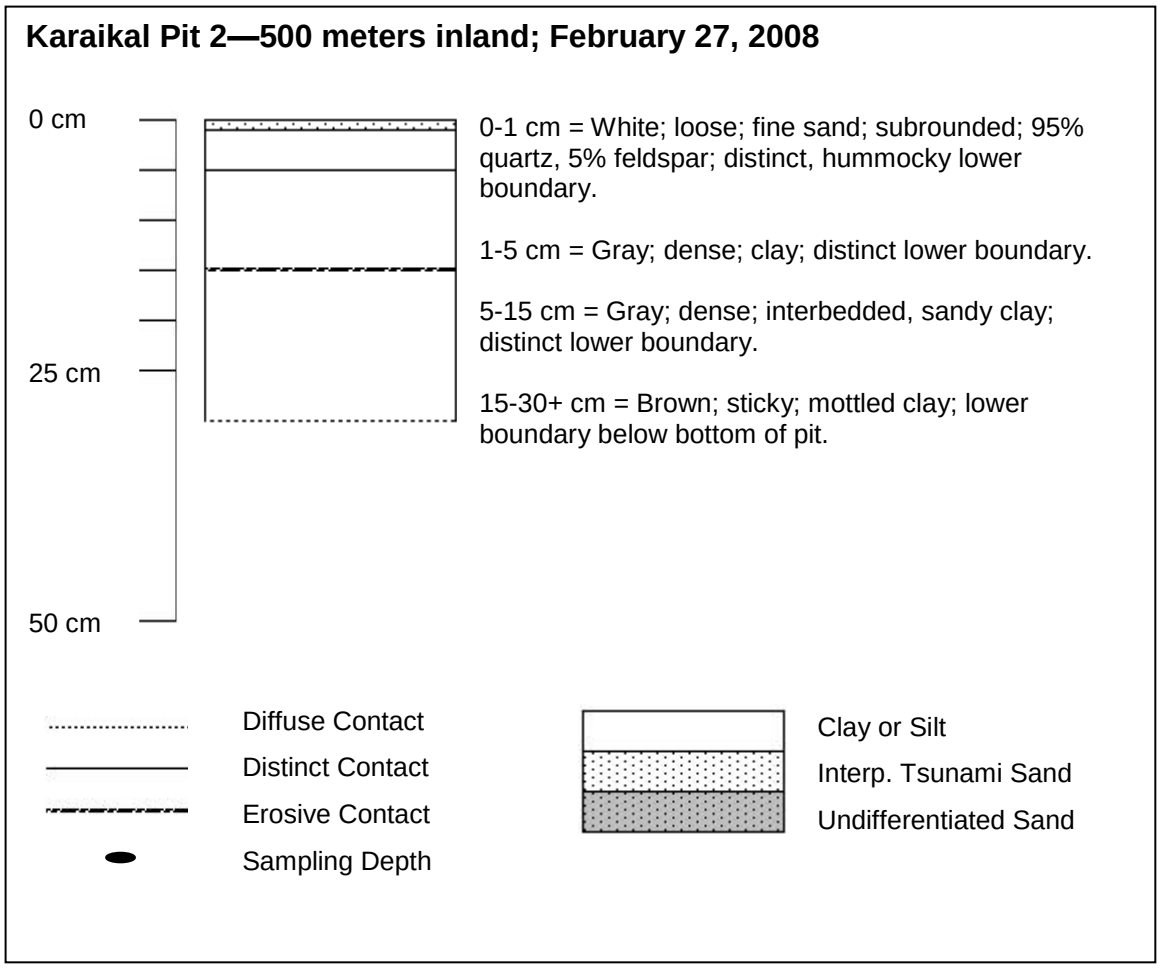
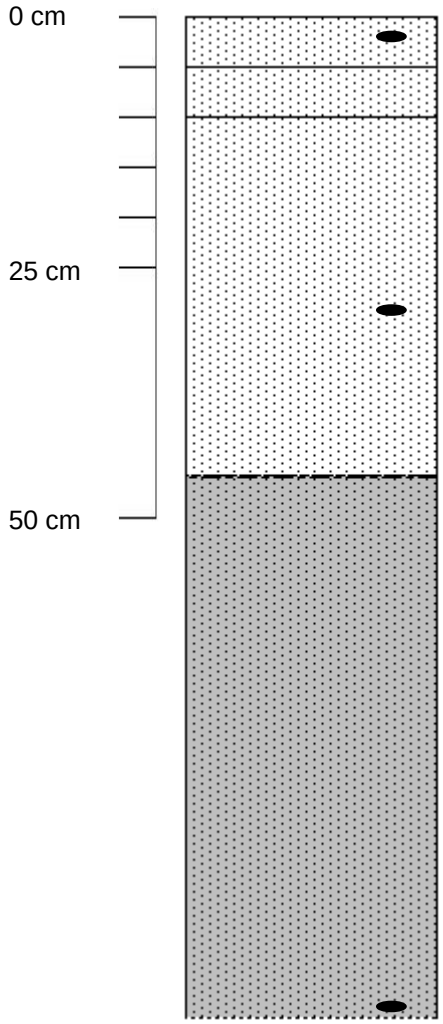


Figure A28. Stratigraphic column and description of Karaikal Pit 2

Kallar Pit 1—200 meters inland; February 24, 2008

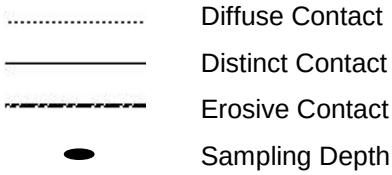


0-5 cm = White; loose; mixed, fine sand; subrounded; 90% quartz, 5% feldspar, 5% dark mafic minerals; bioturbated; distinct, hummocky lower boundary.

5-10 cm = White; loose; numerous dark mineral laminations, fine sand; subrounded; 75% quartz 5% feldspar 20% dark mafic minerals; distinct lower boundary.

10-46 cm = White; loose; numerous dark mineral laminations, fine sand; subrounded to subangular; 65% quartz, 5% feldspar, 30% dark mafic minerals; distinct lower boundary.

46-100 cm = Red; moderately dense; mottled, fine sand; subrounded to subangular; 90% quartz, 5% feldspar, 5% dark mafic minerals; lower boundary below bottom of pit.



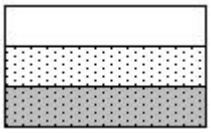


Figure A29. Stratigraphic column and description of Kallar Pit 1

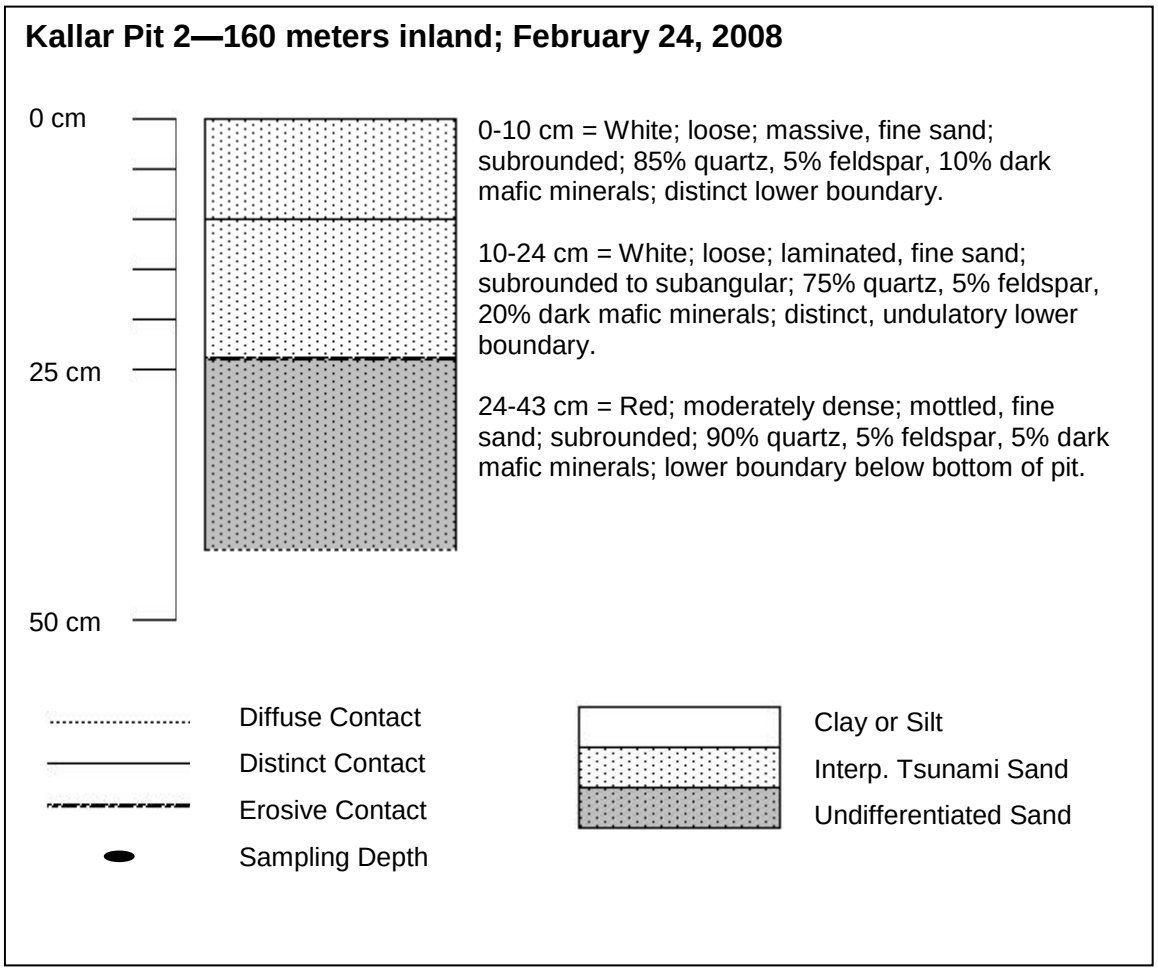
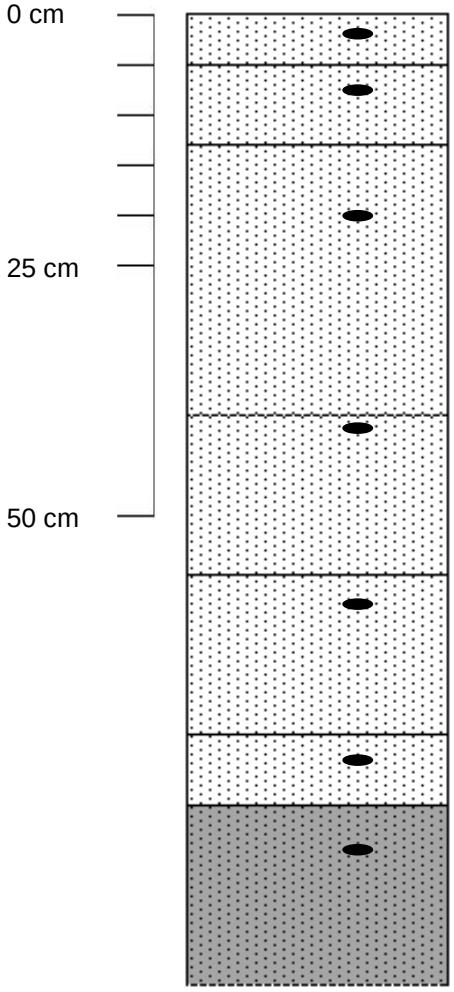


Figure A30. Stratigraphic column and description of Kallar Pit 2

Vailanganni Pit 1—100 meters inland; February 24, 2008



0-5 cm = White; loose; thin dark mineral laminations, fine sand; subrounded; 95% quartz, 5% feldspar; distinct lower boundary.

5-13 cm = Moderate brown to dark brown; loose; mottled fine sand; subrounded; 95% quartz, 5% feldspar; distinct lower boundary.

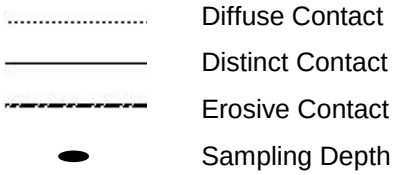
13-40 cm = Red-tan; moderately dense; mottled fine sand; normally graded; subrounded to subangular; 90% quartz, 5% feldspar, 5% dark mafic minerals; diffuse lower boundary.

40-56 cm = Gray to dark gray; moderately dense; fine sand; subrounded to subangular; 90% quartz, 10% dark mafic minerals; distinct lower boundary.

56-72 cm = Yellowish-tan; loose; mottled fine sand; subrounded to subangular; 90% quartz, 10% feldspar; distinct lower boundary.

72-79 cm = Dark brown to black; dense; fine sand; subrounded; 90% quartz, 5% feldspar; 5% dark mafic minerals; abundant organics; distinct, hummocky lower boundary.

79-97+ cm = Gray; dense; silty-clayey fine sand; subrounded; sand is 80% quartz 10% feldspar; 10% dark mafic minerals; diffuse lower boundary at water table.



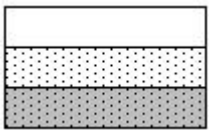
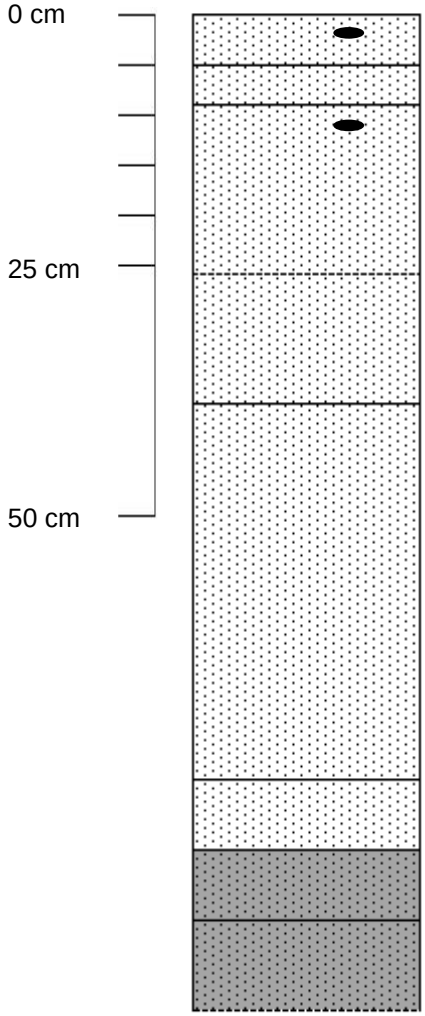


Figure A31. Stratigraphic column and description of Vailanganni Pit 1

Vailanganni Pit 2—130 meters inland; February 24, 2008



0-5 cm = White; loose; fine sand; subrounded; 95% quartz, 5% feldspar; distinct lower boundary.

5-9 cm = Dark brown to black; dense; fine sand; subrounded; 90% quartz, 5% feldspar, 5% dark mafic minerals; abundant organics; distinct lower boundary.

9-26 cm = Red and tan; moderately dense; mottled fine sand; subrounded to subangular; 90% quartz, 5% feldspar, 5% dark mafic minerals; diffuse lower boundary.

26-39 cm = Red; moderately dense; mottled fine sand; subrounded to subangular; 90% quartz, 5% feldspar, 5% dark mafic minerals; distinct, undulatory lower boundary.

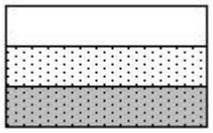
39-77 cm = Gray; moderately dense; fine sand; subrounded; 90% quartz, 10% dark mafic minerals; brick fragments; distinct, mottled lower boundary.

77-84 cm = Tan; loose; fine sand; subrounded to subangular; 90% quartz, 5% feldspar, 5% dark mafic minerals; distinct, hummocky lower boundary.

84-91 cm = Orange-tan; loose; mottled fine sand; subrounded to subangular; 90% quartz, 5% feldspar, 5% dark mafic minerals; distinct, undulatory lower boundary.

91-100 cm = Blue-gray; moderately dense; silty fine sand; subangular to subrounded; 90% quartz, 5% feldspar, 5% dark mafic minerals; lower boundary below base of pit.

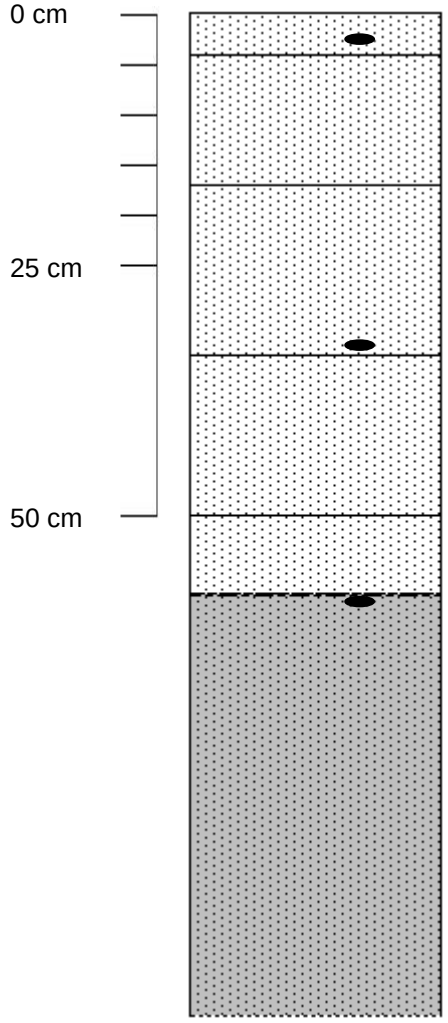
Diffuse Contact
Distinct Contact
Erosive Contact
Sampling Depth



Clay or Silt
Interp. Tsunami Sand
Undifferentiated Sand

Figure A32. Stratigraphic column and description of Vailanganni Pit 2

Vailanganni Pit 3—130 meters inland, 100m N of Pit 2; February 24, 2008



0-4 cm = White; loose; fine sand; subrounded; 95% quartz, 5% feldspar; distinct lower boundary.

4-17 cm = Red; loose; mottled, fine sand; subrounded; 90% quartz, 5% feldspar, 5% dark mafic minerals; distinct lower boundary.

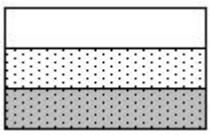
17-34 cm = Gray; moderately dense; fine-medium sand; subrounded to subanbular; 90% quartz, 5% feldspar, 5% dark mafic minerals; distinct lower boundary.

34-50 cm = White-orange; loose; fine sand; subrounded; 90% quartz, 10% feldspar; distinct lower boundary.

50-58 cm = White-orange with black; moderately dense; fine laminated sand; subrounded to subangular; 65% quartz, 5% feldspar, 30% dark mafic minerals; distinct, hummocky lower boundary.

58- 100+ cm = Gray; moderately dense; weakly laminated medium sand; subangular to subrounded; 90% quartz, 5% feldspar, 5% dark mafic minerals; laminations are as deep as 1 meter; lower boundary below bottom of pit.

Diffuse Contact
Distinct Contact
Erosive Contact
Sampling Depth



Clay or Silt
Interp. Tsunami Sand
Undifferentiated Sand

Figure A33. Stratigraphic column and description of Vailanganni Pit 3

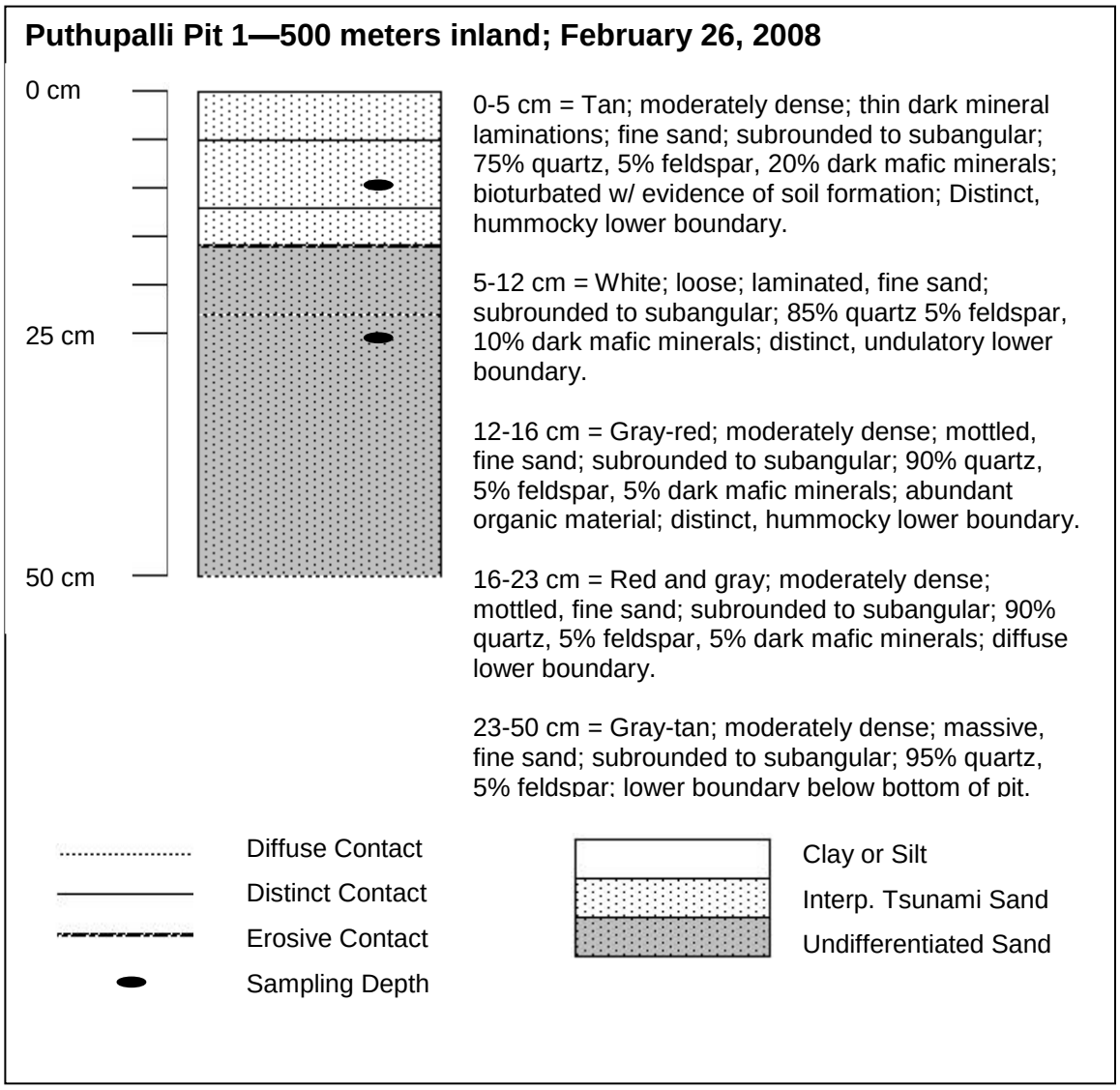
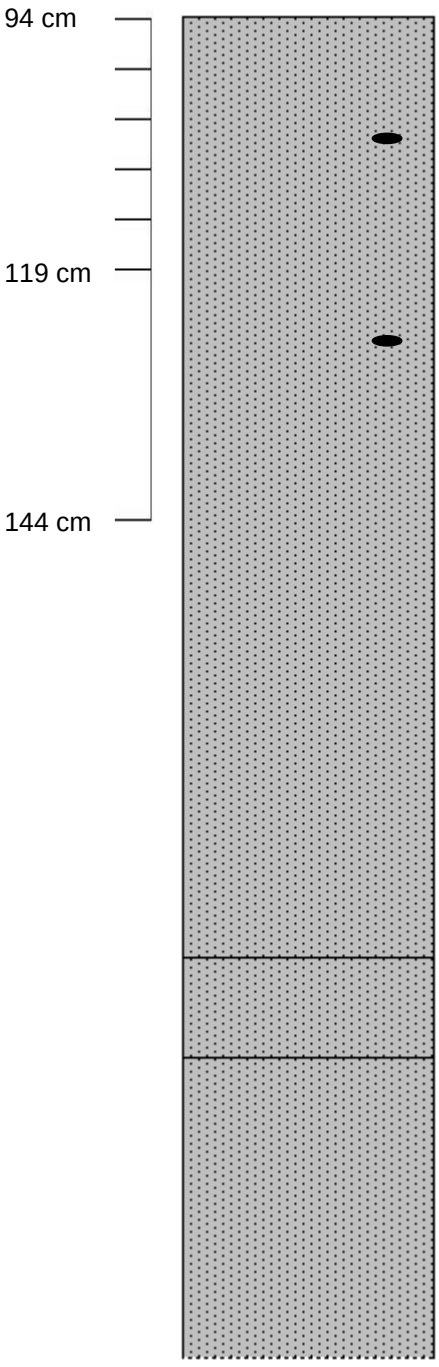


Figure A34. Stratigraphic column and description of Puthupalli Pit 1

Vilundamavadi Pit 1—450 meters inland; February 26, 2008



94-180 cm = Red and tan; moderately dense; heavily laminated, mottled fine sand; subrounded to subangular; 80% quartz, 5% feldspar, 15% dark mafic minerals; laminations broken and truncated in places; distinct lower boundary.

180-190 cm = Red; moderately dense; mottled fine sand; subrounded to subangular; 85% quartz, 5% feldspar, 10% dark mafic minerals; occasional laminations; some evidence of soil development and silt leaching; distinct lower boundary.

190-220 cm = Tan; moderately dense; massive fine sand; subrounded; 90% quartz, 5% feldspar, 5% dark mafic minerals; lower boundary below base of pit.

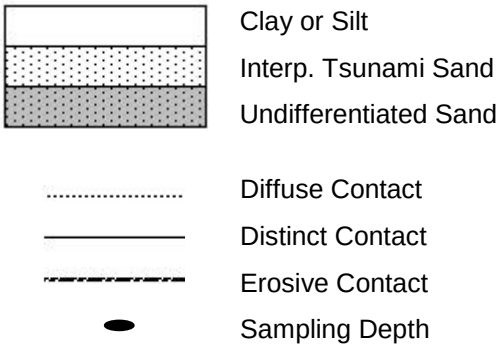


Figure A35. Stratigraphic column and description of Vilundamavadi Pit 1, from beneath a Holocene dune.

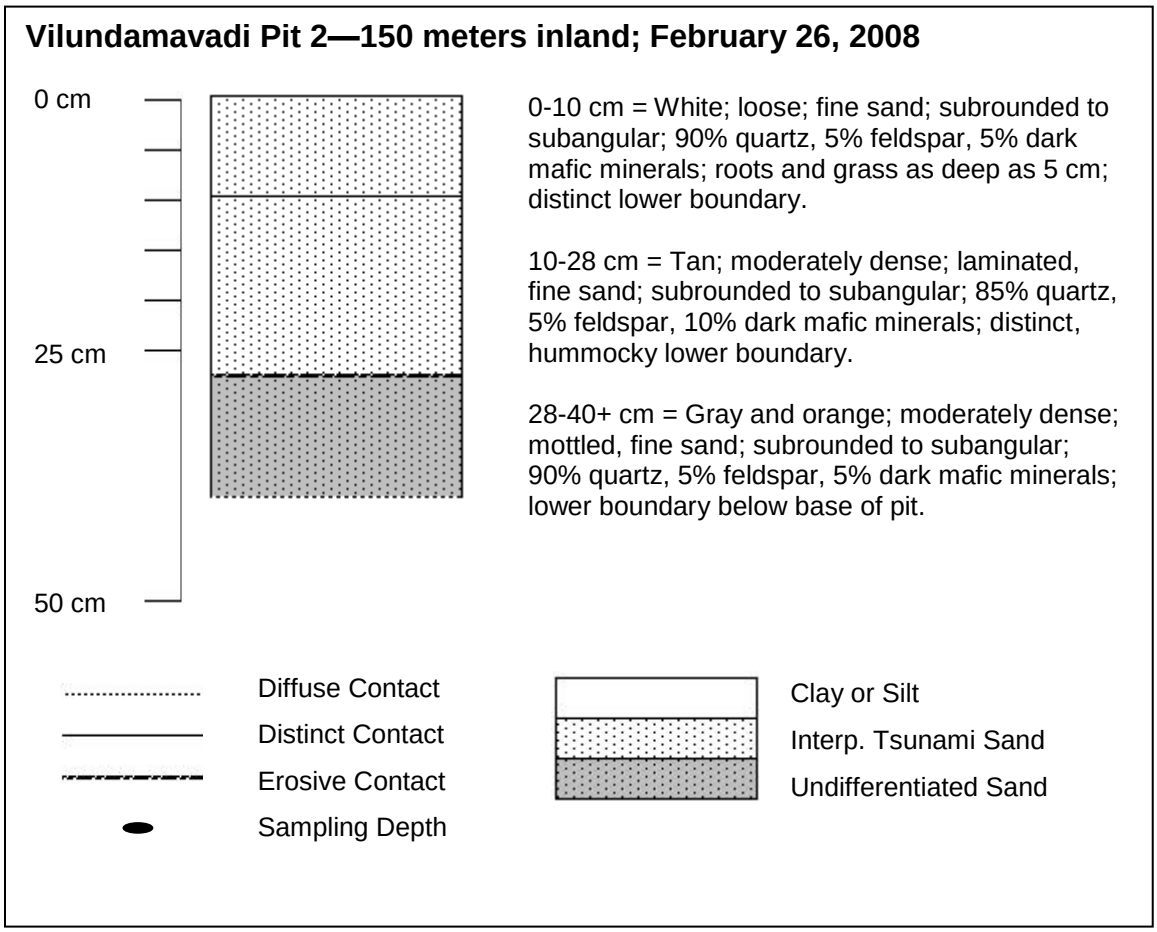


Figure A36. Stratigraphic column and description of Vilundamavadi Pit 2

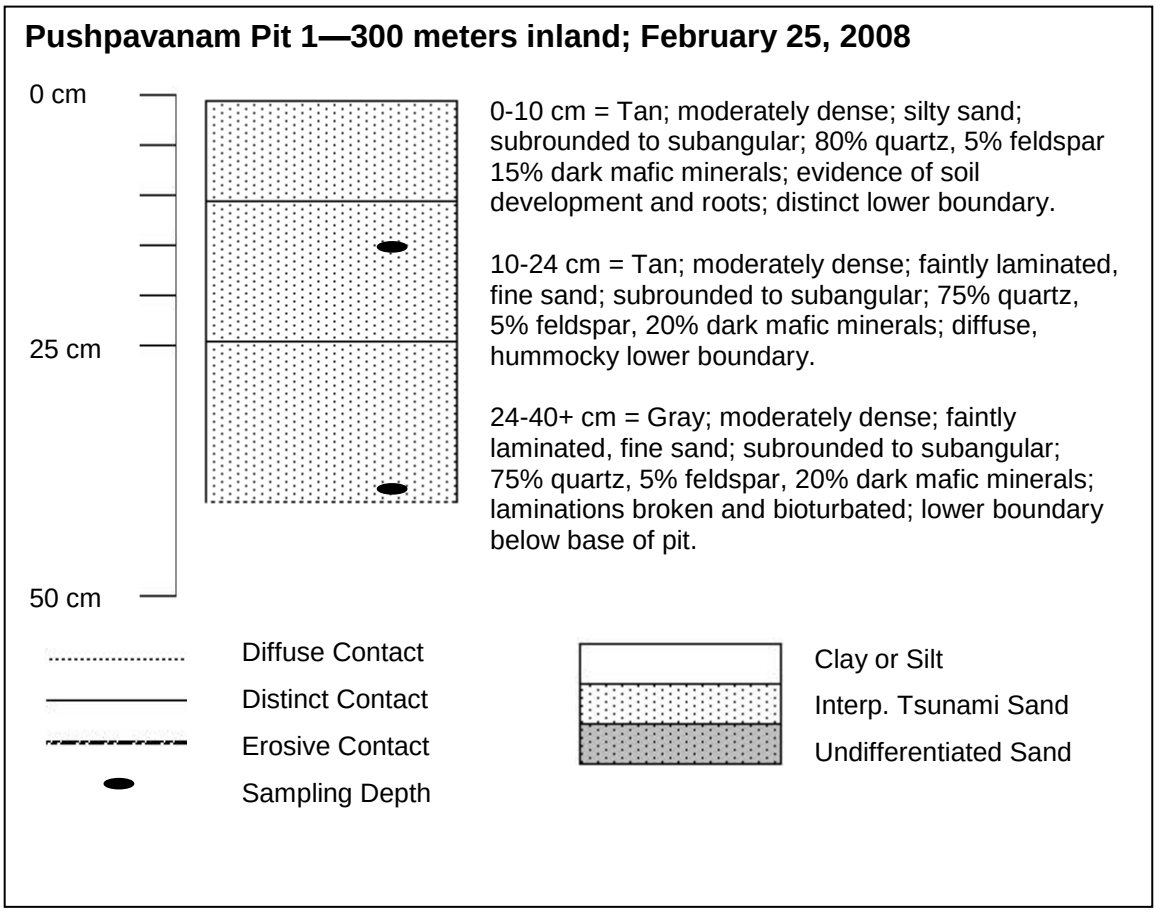
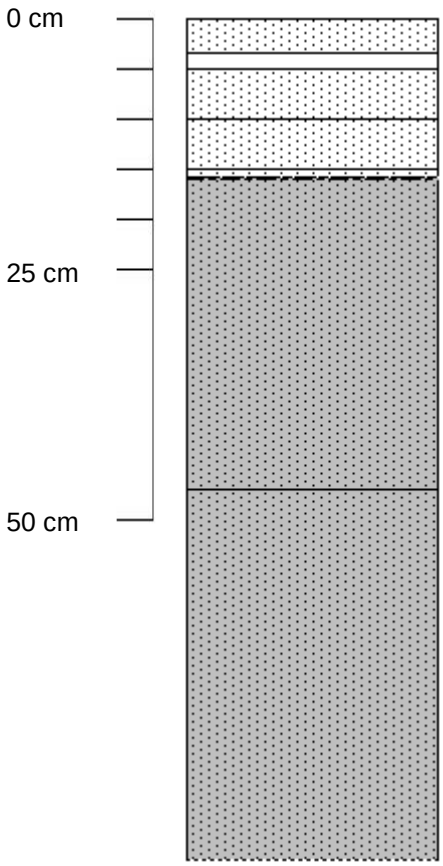


Figure A37. Stratigraphic column and description of Pushpavanam Pit 1

Vedaranyam Pit 1—200 meters inland; February 25, 2008



0-3.5 cm = White; loose; very fine sand; subrounded; 95% quartz, 5% feldspar; distinct lower boundary.

3.5-5 cm = Gray; dense; hummocky, silty clay; distinct lower boundary.

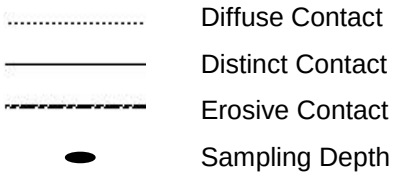
5-10 cm = Tan; moderately dense; fine sand; subrounded; 90% quartz, 5% feldspar, 5% dark mafic minerals; contains roots; distinct lower boundary.

10-15 cm = Tan; moderately dense; interbedded fine sand and clay; sand is subrounded; 95% quartz 5% feldspar; clay ripup clasts; distinct, hummocky lower boundary.

15-16 cm = Black; moderately dense; organic sand; subrounded; 90% quartz, 5% feldspar, 5% dark mafic minerals; distinct lower boundary.

16-47 cm = Tan; moderately dense; heavily laminated, fine sand; subrounded; 65% quartz, 5% feldspar, 30% dark mafic minerals; distinct lower boundary.

47-84+ cm = Tan; moderately dense; faintly laminated, fine sand; subrounded; 85% quartz, 5% feldspar, 10% dark mafic minreals; lower boundary below base of pit.



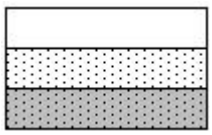
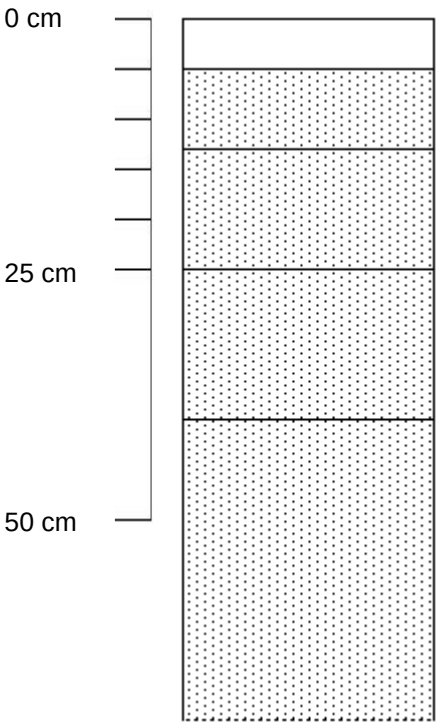


Figure A38. Stratigraphic column and description of Vedaranyam Pit 1

Vedaranyam Pit 2—210 meters inland; February 25, 2008



0-5 cm = Gray-brown; thick, sticky clay; surficial mudcracks; distinct lower boundary.

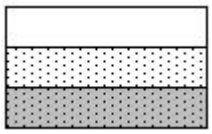
5-13 cm = Tan; moderately dense; thin dark mineral laminations, fine sand; subrounded to subangular; 75% quartz, 5% feldspar, 20% dark mafic minerals; distinct lower boundary.

13-25 cm = Tan; moderately dense; thin dark mineral laminations; interbedded sand and clay; subrounded; 65% quartz, 5% feldspar, 30% dark mafic minerals; soft sediment deformation; distinct, hummocky lower boundary.

25-40 cm = Brown; moderately dense; massive, fine sand; subrounded to subangular; 90% quartz, 5% feldspar, 5% dark mafic minerals, trace clay leaching; distinct lower boundary.

40-70 cm = Gray; moderately dense; massive, fine sand; subrounded to subangular; 90% quarts, 5% feldspar, 5% dark mafic minerals; lower boundary below base of pit.

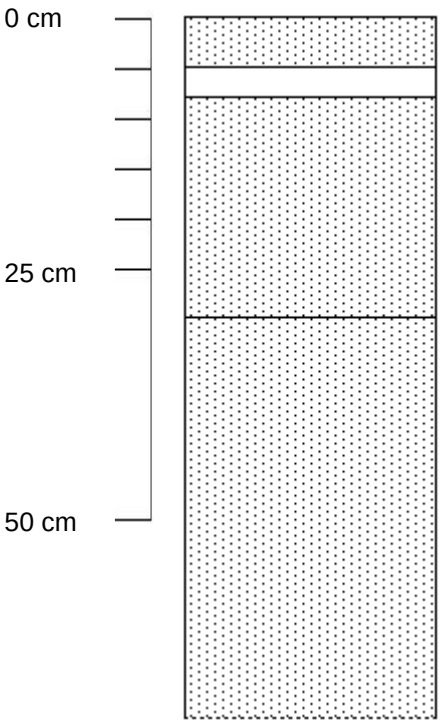
Diffuse Contact
Distinct Contact
Erosive Contact
Sampling Depth



Clay or Silt
Interp. Tsunami Sand
Undifferentiated Sand

Figure A39. Stratigraphic column and description of Vedaranyam Pit 2

Vedaranyam Pit 3—300 meters inland; February 25, 2008



0-5 cm = White; loose; fine sand; 90% quartz, 10% feldspar; distinct lower boundary.

5-8 cm = Gray; dense clay; distinct lower boundary.

8-30 cm = White-tan; moderately dense; laminated, fine sand; 75% quartz, 5% feldspar, 20% dark mafic minerals; distinct, undulatory, erosional lower boundary.

30-70 cm = Tan; moderately dense; thin dark mineral laminations, fine sand; 85% quarts, 5% feldspar, 10% dark mafic minerals; lower boundary below base of pit.

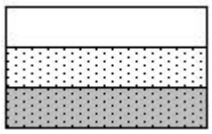


Figure A40. Stratigraphic column and description of Vedaranyam Pit 3

Appendix B

Grain Size Data and Calculations

Mastersizer laser diffractometer data is compared to wet sieve data from Mamallapuram Pit #1 in Figures B1-B4. Grain size data is summarized in Table B1. Grain size calculations using the data in Table B1 are summarized in Table B2. The order of the tables is based on what order we sampled in the field. For example, Aalikuppam sample 02-09-08-S5 was sampled on February 9th, 2008 and was sample number 5. Refer to Table 1 for geomorphic environment and condition of tsunami deposit.

Comparison of Mastersizer Data to Sieve Data

This section shows a comparison between sieve data in this study to Mastersizer 2000 data in this study (Figures B1-B4). The sample location analyzed is Mamallapuram pit 1. The overall finer signature of the sieve results were expected as a result of sieve analysis effectively measuring the short axis of each grain, whereas the Mastersizer takes a average size of each individual grain in 3D space. The overall trends are noticeably similar. It is worth noting that where the statistics diverge (i.e., 6 cm depth on Figure B1) there is an abundance of mafic minerals which were elongate relative to the otherwise quartz-dominated samples. This led to a much finer measurement in the sieve analysis of these samples and minimized the sorting variation (Figures B1, B2).

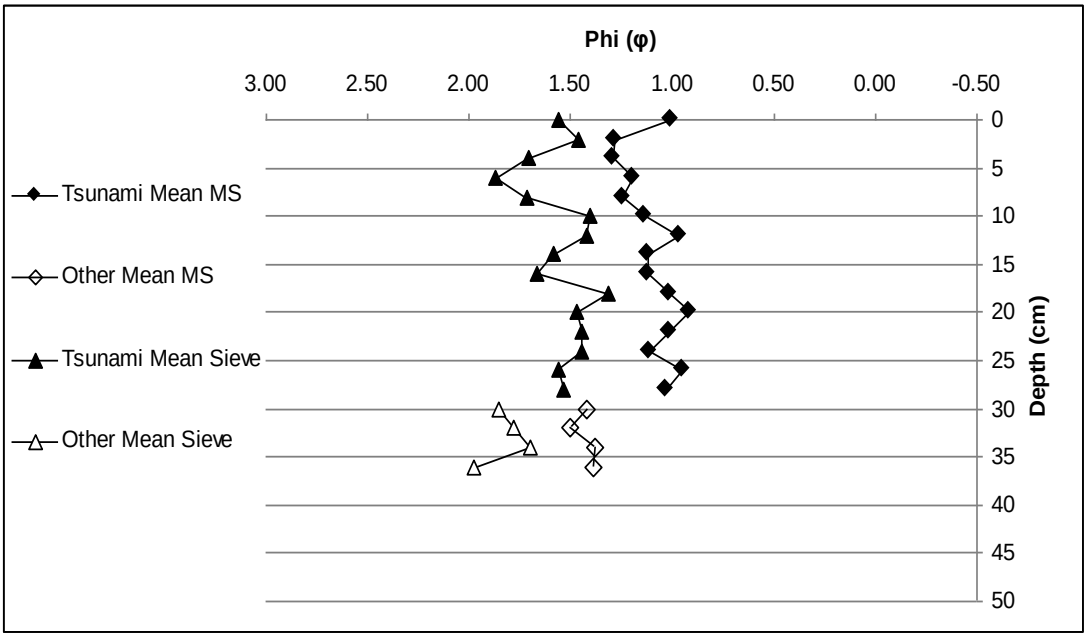


Figure B1. Sieve mean vs. Mastersize mean Mamallapuram Pit 1.

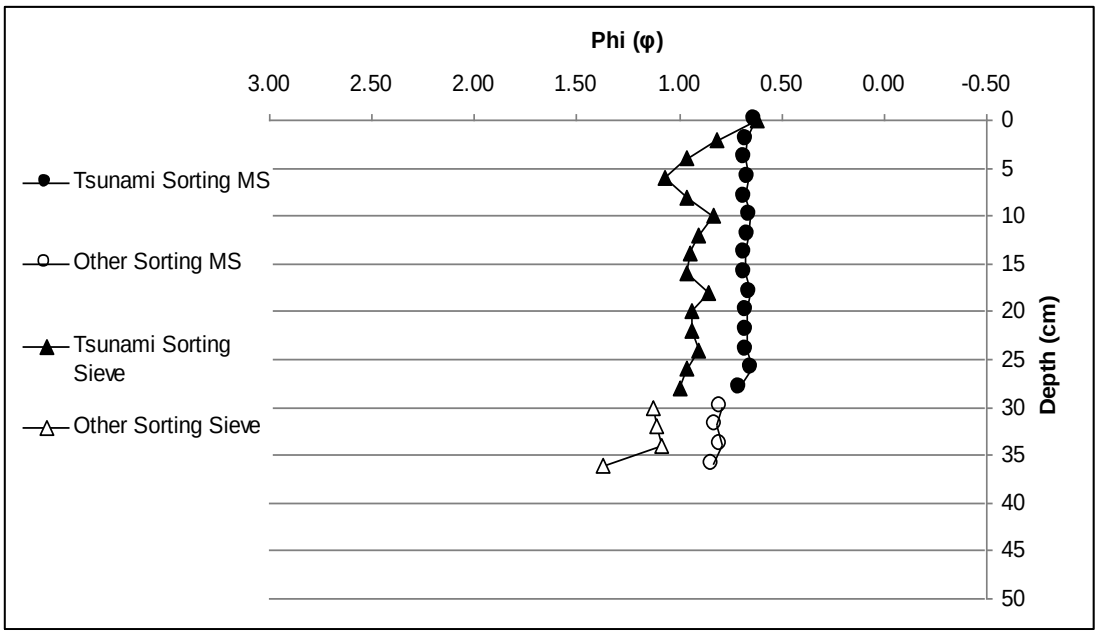


Figure B2. Sieve sorting vs. Mastersizer sorting Mamallapuram Pit 1.

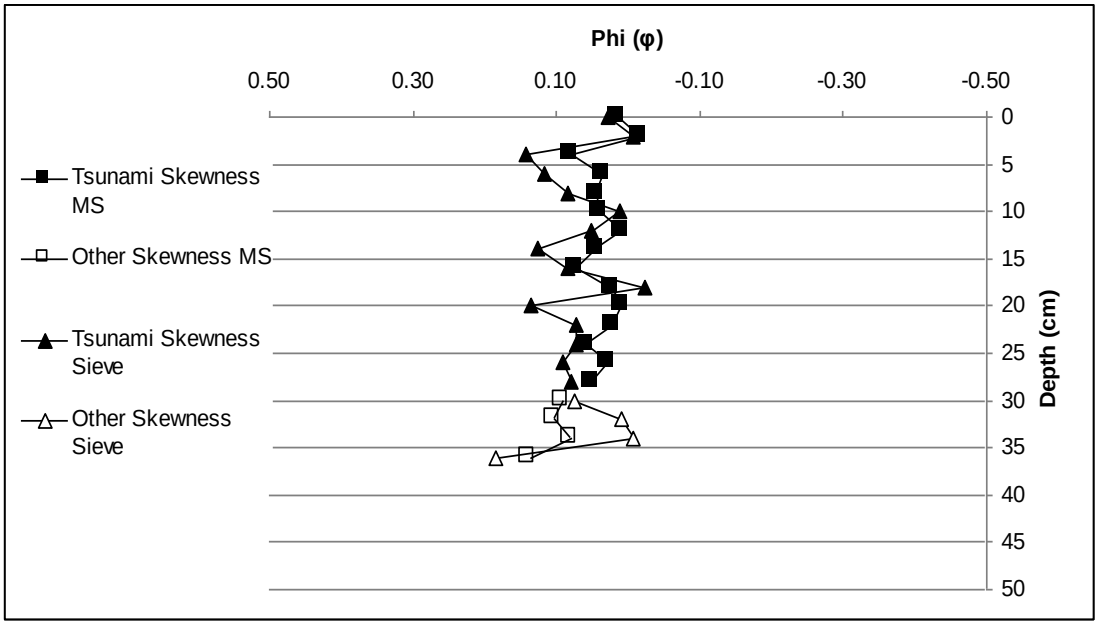


Figure B3. Sieve skewness vs. Mastersizer skewness Mamallapuram Pit 1.

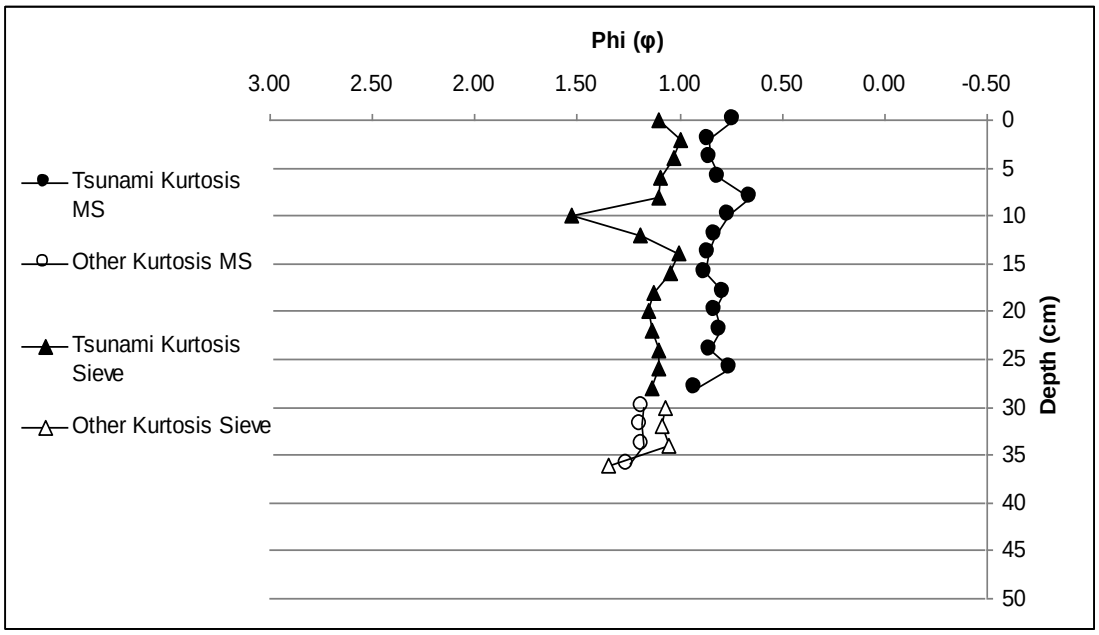


Figure B4. Sieve kurtosis vs. Mastersizer kurtosis Mamallapuram Pit 1.

Table B1. GRAIN SIZE DATA: MEASURED BY MASTERSIZER 2000

Site	Sample	Pit	Distance Inland	φ 95	φ84	φ75	φ50	φ25	φ16	φ5
Aalikuppam	02-09-08-S5	1	150	2.36	1.89	1.62	1.14	0.66	0.45	0.06
Aalikuppam	02-09-08-S6	1	150	2.54	2.05	1.81	1.33	0.81	0.60	0.24
Aalikuppam	02-09-08-S7	1	150	2.38	1.97	1.76	1.23	0.73	0.51	0.12
Aalikuppam	02-09-08-S8	1	150	2.37	1.93	1.72	1.20	0.73	0.50	0.11
Aalikuppam	02-09-08-S9	1	150	2.21	1.83	1.58	1.09	0.58	0.40	0.02
Aalikuppam	02-09-08-S10	1	150	2.13	1.73	1.53	1.04	0.54	0.37	-0.01
Aalikuppam	02-09-08-S11	1	150	2.06	1.71	1.51	1.07	0.65	0.46	0.16
Aalikuppam	02-09-08-S12	1	150	2.02	1.54	1.36	0.85	0.38	0.16	-0.22
Aalikuppam	02-09-08-S13	1	150	1.92	1.49	1.25	0.76	0.27	0.06	-0.34
Aalikuppam	02-09-08-S14	1	150	2.24	1.83	1.60	1.13	0.68	0.46	0.09
Aalikuppam	02-09-08-S15	1	150	2.31	1.93	1.73	1.31	0.92	0.72	0.37
Aalikuppam	02-09-08-S16	1	150	2.40	2.03	1.81	1.37	0.93	0.74	0.37
Aalikuppam	02-09-08-S17	1	150	2.09	1.69	1.45	0.99	0.52	0.32	-0.03
Thiruvadandhai	02-11-08-S18	1	50	1.84	1.45	1.29	0.87	0.46	0.28	-0.03
Thiruvadandhai	02-11-08-S19	1	50	2.22	1.79	1.56	1.10	0.61	0.42	0.06
Thiruvadandhai	02-11-08-S20	1	50	2.03	1.69	1.51	1.07	0.66	0.47	0.14
Thiruvadandhai	02-11-08-S21	2	100	5.11	3.24	2.60	1.71	1.12	0.87	0.40
Thiruvadandhai	02-11-08-S22	2	100	2.60	2.13	1.94	1.49	1.06	0.88	0.56
Thiruvadandhai	02-11-08-S23	2	100	2.63	2.18	1.97	1.47	1.00	0.79	0.40
Thiruvadandhai	02-11-08-S24	2	100	2.44	1.97	1.71	1.19	0.74	0.50	0.09
Thiruvadandhai	02-11-08-S25	2	100	2.60	1.81	1.53	0.98	0.47	0.25	-0.18
Thiruvadandhai	02-11-08-S26	2	100	2.42	1.97	1.71	1.21	0.74	0.52	0.14
Thiruvadandhai	02-11-08-S27	2	100	2.25	1.85	1.63	1.21	0.81	0.61	0.27
Thiruvadandhai	02-11-08-S28	2	100	2.43	2.04	1.88	1.47	1.08	0.92	0.56
Thiruvadandhai	02-11-08-S29	2	100	2.40	2.01	1.81	1.42	1.03	0.84	0.51
Thiruvadandhai	02-11-08-S30	3	150	2.20	1.79	1.58	1.07	0.60	0.42	0.08
Thiruvadandhai	02-11-08-S31	3	150	2.05	1.65	1.42	0.98	0.52	0.35	0.01
Thiruvadandhai	02-11-08-S32	3	150	1.88	1.51	1.31	0.88	0.47	0.27	-0.09
Thiruvadandhai	02-11-08-S33	3	150	1.92	1.57	1.37	0.94	0.50	0.31	-0.06
Thiruvadandhai	02-11-08-S34	3	150	2.05	1.61	1.42	0.94	0.46	0.26	-0.11
Thiruvadandhai	02-11-08-S35	3	150	2.43	1.94	1.73	1.22	0.75	0.52	0.18
Thiruvadandhai	02-11-08-S36	3	150	2.41	1.94	1.71	1.23	0.75	0.56	0.19
Thiruvadandhai	02-11-08-S37	3	150	1.98	1.58	1.40	0.94	0.50	0.29	-0.04
Thiruvadandhai	02-11-08-S38	3	150	2.29	1.86	1.62	1.14	0.69	0.46	0.10
Thiruvadandhai	02-11-08-S39	3	150	1.78	1.38	1.19	0.74	0.33	0.12	-0.21
Thiruvadandhai	02-11-08-S40	3	150	1.89	1.47	1.23	0.74	0.26	0.02	-0.38
Thiruvadandhai	02-11-08-S41	3	150	1.64	1.21	1.00	0.51	0.03	-0.20	-0.58
Thiruvadandhai	02-11-08-S42	3	150	1.67	1.27	1.06	0.59	0.10	-0.03	-0.47
Thiruvadandhai	02-11-08-S43	3	150	1.40	1.05	0.85	0.44	0.03	-0.17	-0.48
Thiruvadandhai	02-11-08-S44	3	150	2.05	1.62	1.38	0.94	0.48	0.26	-0.10
Thiruvadandhai	02-11-08-S45	3	150	2.15	1.74	1.51	1.01	0.59	0.39	0.02
Thiruvadandhai	02-11-08-S46	3	150	1.81	1.38	1.14	0.68	0.20	0.01	-0.39

Thiruvadandhai	02-11-08-S47	3	150	2.22	1.74	1.48	1.00	0.49	0.28	-0.09
Thiruvadandhai	02-11-08-S48	3	150	1.70	1.29	1.09	0.58	0.10	-0.12	-0.49
Thiruvadandhai	02-11-08-S49	3	150	1.89	1.45	1.22	0.75	0.23	0.01	-0.40
Thiruvadandhai	02-11-08-S50	3	150	1.89	1.51	1.29	0.80	0.52	0.14	-0.22
Thiruvadandhai	02-11-08-S51	4	200	1.88	1.49	1.30	0.83	0.37	0.17	-0.17
Thiruvadandhai	02-11-08-S52	4	200	3.16	2.09	1.75	1.20	0.61	0.34	-0.05
Thiruvadandhai	02-11-08-S53	5	250	2.20	1.81	1.60	1.06	0.56	0.34	-0.04
Thiruvadandhai	02-11-08-S54	5	250	2.04	1.56	1.34	0.79	0.32	0.06	-0.33
Thiruvadandhai	02-11-08-S55	6	280	1.84	1.42	1.19	0.66	0.19	-0.04	-0.44
Thiruvadandhai	02-11-08-S56	7	300	1.89	1.43	1.22	0.72	0.23	0.01	-0.38
Thiruvadandhai	02-11-08-S57	8	320	2.40	1.87	1.62	1.12	0.63	0.42	0.06
Kovalam	02-12-08-S58	1	40	2.63	2.12	1.85	1.35	0.86	0.66	0.26
Kovalam	02-12-08-S59	1	40	2.33	1.88	1.61	1.10	0.59	0.40	0.01
Kovalam	02-12-08-S60	1	40	2.05	1.65	1.43	0.95	0.48	0.26	-0.09
Kovalam	02-12-08-S61	1	40	2.58	2.09	1.84	1.34	0.87	0.57	0.26
Kovalam	02-12-08-S62	1	40	2.64	2.14	1.90	1.38	0.90	0.67	0.29
Kovalam	02-12-08-S63	1	40	2.70	2.24	2.01	1.55	1.07	0.87	0.47
Kovalam	02-12-08-S64	1	40	2.43	1.94	1.73	1.23	0.76	0.54	0.16
Kovalam	02-12-08-S65	1	40	2.59	2.22	2.00	1.56	1.18	0.99	0.59
Kovalam	02-12-08-S66	1	40	2.69	2.29	2.08	1.59	1.14	0.94	0.55
Mamallapuram	02-13-08-S71	2	200	2.41	2.00	1.79	1.36	0.88	0.68	0.34
Mamallapuram	02-13-08-S72	2	200	2.60	2.11	1.88	1.36	0.88	0.66	0.29
Mamallapuram	02-13-08-S73	3	250	2.45	2.03	1.81	1.32	0.82	0.62	0.26
Mamallapuram	02-13-08-S74	3	250	2.44	1.85	1.62	1.14	0.66	0.44	0.09
Mamallapuram	02-15-08-S75	4	350	2.43	1.83	1.60	1.09	0.63	0.42	0.06
Mamallapuram	02-15-08-S76	4	350	2.31	1.82	1.58	1.10	0.61	0.42	0.08
Mamallapuram	02-15-08-S77	5	450	2.43	1.86	1.62	1.16	0.71	0.50	0.17
Mamallapuram	02-15-08-S78	5	450	2.48	2.00	1.76	1.26	0.80	0.58	0.22
Mamallapuram	02-15-08-S79	6	500	2.16	1.76	1.56	1.15	0.74	0.52	0.21
Mamallapuram	02-15-08-S80	6	500	2.43	2.00	1.78	1.34	0.86	0.66	0.33
Mamallapuram	02-15-08-S81	Dune	520	2.45	2.00	1.78	1.31	0.86	0.66	0.32
Mamallapuram	02-15-08-S82	1	120	2.06	1.66	1.47	1.01	0.56	0.34	0.07
Mamallapuram	02-15-08-S83	1	120	2.37	1.97	1.80	1.30	0.80	0.58	0.26
Mamallapuram	02-15-08-S84	1	120	2.44	2.00	1.76	1.26	0.81	0.62	0.25
Mamallapuram	02-15-08-S85	1	120	2.29	1.88	1.66	1.18	0.71	0.50	0.21
Mamallapuram	02-15-08-S86	1	120	2.40	1.94	1.71	1.23	0.97	0.54	0.25
Mamallapuram	02-15-08-S87	1	120	2.22	1.81	1.56	1.12	0.67	0.47	0.12
Mamallapuram	02-15-08-S88	1	120	2.06	1.64	1.43	0.97	0.48	0.29	-0.06
Mamallapuram	02-15-08-S89	1	120	2.24	1.83	1.60	1.10	0.63	0.42	0.09
Mamallapuram	02-15-08-S90	1	120	2.24	1.83	1.60	1.08	0.62	0.44	0.07
Mamallapuram	02-15-08-S91	1	120	2.11	1.68	1.46	1.01	0.55	0.35	0.01
Mamallapuram	02-15-08-S92	1	120	2.03	1.60	1.38	0.92	0.44	0.22	-0.13
Mamallapuram	02-15-08-S93	1	120	2.12	1.71	1.47	1.01	0.56	0.32	-0.01
Mamallapuram	02-15-08-S94	1	120	2.24	1.81	1.58	1.09	0.62	0.43	0.08
Mamallapuram	02-15-08-S95	1	120	2.00	1.62	1.38	0.94	0.47	0.29	-0.03

Mamallapuram	02-15-08-S96	1	120	2.22	1.76	1.54	1.01	0.54	0.31	-0.03
Mamallapuram	02-15-08-S97	1	120	2.89	2.22	1.97	1.40	0.89	0.66	0.24
Mamallapuram	02-15-08-S98	1	120	3.04	2.32	2.03	1.47	0.97	0.72	0.30
Mamallapuram	02-15-08-S99	1	120	2.83	2.18	1.92	1.36	0.82	0.60	0.20
Mamallapuram	02-15-08-S100	1	120	3.02	2.22	1.92	1.34	0.84	0.60	0.19
Mamallapuram	02-15-08-S101	1	120	2.51	2.00	1.74	1.22	0.66	0.41	0.02
Mamallapuram	02-15-08-S102	1	120	2.41	1.87	1.62	1.10	0.57	0.39	0.01
Vadanemelli	02-16-08-S104	1	100	2.46	1.69	1.43	0.78	0.21	-0.01	-0.38
Vadanemelli	02-16-08-S105	1	100	2.13	1.69	1.47	1.00	0.51	0.30	-0.07
Vadanemelli	02-16-08-S106	1	100	2.07	1.64	1.43	0.93	0.45	0.25	-0.11
Vadanemelli	02-16-08-S107	1	100	4.06	1.84	1.55	0.98	0.47	0.25	-0.16
Vadanemelli	02-16-08-S108	1	100	1.86	1.43	1.23	0.74	0.27	0.06	-0.27
Vadanemelli	02-16-08-S109	1	100	4.64	1.88	1.56	0.92	0.38	0.14	-0.27
Vadanemelli	02-16-08-S110	1	100	2.05	1.62	1.36	0.87	0.40	0.20	-0.18
Vadanemelli	02-16-08-S111	1	100	2.62	1.99	1.74	1.15	0.63	0.36	-0.07
Vadanemelli	02-16-08-S112	1	100	2.26	1.67	1.42	0.91	0.43	0.22	-0.17
Vadanemelli	02-16-08-S113	1	100	3.25	2.07	1.75	1.10	0.55	0.29	-0.13
Vadanemelli	02-16-08-S114	1	100	1.65	1.31	1.11	0.71	0.29	0.10	-0.26
Aalikuppam	02-17-08-S115	2	200	2.29	1.91	1.69	1.22	0.77	0.55	0.21
Aalikuppam	02-17-08-S116	2	200	2.22	1.83	1.60	1.10	0.60	0.42	0.02
Aalikuppam	02-17-08-S117	3	350	2.20	1.79	1.54	1.03	0.52	0.32	-0.06
Aalikuppam	02-17-08-S118	3	350	1.83	1.42	1.22	0.79	0.37	0.17	-0.20
Aalikuppam	02-17-08-S119	3	350	2.09	1.75	1.56	1.10	0.71	0.52	0.19
Aalikuppam	02-17-08-S120	4	400	2.05	1.69	1.51	1.09	0.71	0.51	0.17
Aalikuppam	02-17-08-S121	4	400	2.18	1.80	1.56	1.16	0.76	0.58	0.25
Karikattakuppam	02-18-08-S122	1	200	2.56	2.18	1.99	1.59	1.19	1.00	0.66
Karikattakuppam	02-18-08-S123	1	200	2.56	2.12	2.02	1.60	1.22	1.03	0.69
Karikattakuppam	02-18-08-S124	2	100	2.45	2.03	1.83	1.37	0.94	0.74	0.41
Karikattakuppam	02-18-08-S125	3	150	2.64	2.12	1.86	1.34	0.80	0.60	0.21
Karikattakuppam	02-18-08-S126	3	150	2.84	2.12	1.86	1.29	0.77	0.50	0.10
Karikattakuppam	02-18-08-S127	4	200	2.65	2.18	1.94	1.44	0.99	0.76	0.37
Muttukaddu	02-18-08-S128	1	500	5.64	3.63	3.32	2.65	2.04	1.68	1.01
Muttukaddu	02-18-08-S129	1	500	4.04	3.49	3.22	2.65	2.05	1.71	1.05
Muttukaddu	02-18-08-S130	1	500	6.38	3.99	3.74	3.20	2.70	2.44	1.88
Muttukaddu	02-18-08-S131	1	500	3.18	2.63	2.38	1.81	1.32	1.04	0.62
Muttukaddu	02-18-08-S132	1	500	6.80	3.64	3.21	2.43	1.66	1.38	0.64
Vailanganni	02-24-08-S133	1	100	3.57	3.08	2.89	2.44	2.01	1.82	1.48
Vailanganni	02-24-08-S134	1	100	3.24	2.65	2.38	1.76	1.09	0.81	0.24
Vailanganni	02-24-08-S135	1	100	3.37	2.88	2.67	2.24	1.83	1.65	1.37
Vailanganni	02-24-08-S136	1	100	5.51	3.01	2.76	2.31	1.83	1.62	1.32
Vailanganni	02-24-08-S137	1	100	3.44	2.84	2.59	2.20	1.79	1.59	1.22
Vailanganni	02-24-08-S138	1	100	3.52	2.85	2.63	2.18	1.74	1.53	1.19
Vailanganni	02-24-08-S139	1	100	7.97	3.40	2.83	2.18	1.71	1.49	1.08
Vailanganni	02-24-08-S140	2	130	3.41	2.98	2.76	2.22	1.74	1.49	1.06
Vailanganni	02-24-08-S141	2	130	3.43	2.94	2.72	2.27	1.84	1.70	1.38

Vailanganni	02-24-08-S142	3	130	5.80	3.43	3.12	2.51	1.94	1.72	1.29
Vailanganni	02-24-08-S143	3	130	3.57	2.95	2.75	2.31	1.86	1.69	1.37
Vailanganni	02-24-08-S144	3	130	3.05	2.73	2.54	2.11	1.72	1.51	1.16
Kallar	02-24-08-S145	1	200	3.10	2.76	2.56	2.16	1.76	1.60	1.28
Kallar	02-24-08-S146	1	200	2.89	2.56	2.36	1.96	1.61	1.43	1.10
Kallar	02-24-08-S147	1	200	3.43	2.93	2.70	2.19	1.66	1.43	0.94
Pushpavanam	02-25-08-S148	1	300	3.43	3.01	2.81	2.40	2.02	1.82	1.49
Pushpavanam	02-25-08-S149	1	300	3.38	3.01	2.85	2.44	2.05	1.87	1.58
Vilundamavadi	02-26-08-S150	1	450	3.07	2.73	2.57	2.12	1.71	1.52	1.22
Vilundamavadi	02-26-08-S151	1	450	3.27	2.87	2.67	2.24	1.81	1.62	1.31
Puthupalli	02-26-08-S152	1	500	3.27	2.87	2.67	2.18	1.72	1.53	1.13
Puthupalli	02-26-08-S153	1	500	3.57	3.04	2.85	2.46	2.11	1.94	1.60
Karaikal	02-27-08-S154	1	200	3.25	2.88	2.64	2.18	1.73	1.50	1.10
Karaikal	02-27-08-S155	1	200	3.61	3.05	2.86	2.47	2.13	1.92	1.58
Tranquebar	02-27-08-S156	1	900	7.64	4.51	3.21	2.45	1.90	1.67	1.23
Tranquebar	02-27-08-S157	1	900	7.97	5.44	3.24	2.51	2.01	1.76	1.37
Cuddalore	02-28-08-S158	1	100	3.01	2.60	2.44	2.05	1.63	1.49	1.15
Cuddalore	02-28-08-S159	1	100	3.18	2.69	2.47	2.02	1.61	1.42	1.08
Cuddalore	02-28-08-S160	1	100	3.04	2.57	2.36	1.89	1.48	1.32	0.94

TABLE B2. GRAIN SIZE CALCULATIONS

Site	Sample	Pit	Mean	Sorting	Skewness	Kurtosis
Aalikuppam	02-09-08-S5	1	1.16	0.71	0.05	0.91
Aalikuppam	02-09-08-S6	1	1.33	0.71	0.02	0.94
Aalikuppam	02-09-08-S7	1	1.24	0.71	0.01	0.95
Aalikuppam	02-09-08-S8	1	1.21	0.70	0.03	0.92
Aalikuppam	02-09-08-S9	1	1.11	0.69	0.03	0.90
Aalikuppam	02-09-08-S10	1	1.04	0.66	0.02	0.87
Aalikuppam	02-09-08-S11	1	1.08	0.60	0.03	0.67
Aalikuppam	02-09-08-S12	1	0.85	0.68	0.02	0.90
Aalikuppam	02-09-08-S13	1	0.77	0.70	0.02	0.91
Aalikuppam	02-09-08-S14	1	1.14	0.67	0.03	0.81
Aalikuppam	02-09-08-S15	1	1.32	0.60	0.03	0.64
Aalikuppam	02-09-08-S16	1	1.38	0.63	0.02	0.73
Aalikuppam	02-09-08-S17	1	1.00	0.66	0.03	0.81
Thiruvadandhai	02-11-08-S18	1	0.87	0.58	0.02	0.64
Thiruvadandhai	02-11-08-S19	1	1.10	0.67	0.02	0.83
Thiruvadandhai	02-11-08-S20	1	1.08	0.59	0.01	0.66
Thiruvadandhai	02-11-08-S21	2	1.94	1.31	0.36	2.86
Thiruvadandhai	02-11-08-S22	2	1.50	0.62	0.05	0.74
Thiruvadandhai	02-11-08-S23	2	1.48	0.69	0.02	0.89
Thiruvadandhai	02-11-08-S24	2	1.22	0.72	0.06	0.94
Thiruvadandhai	02-11-08-S25	2	1.01	0.81	0.12	1.21
Thiruvadandhai	02-11-08-S26	2	1.23	0.71	0.05	0.91
Thiruvadandhai	02-11-08-S27	2	1.22	0.61	0.03	0.67
Thiruvadandhai	02-11-08-S28	2	1.48	0.56	0.02	0.61
Thiruvadandhai	02-11-08-S29	2	1.43	0.58	0.02	0.60
Thiruvadandhai	02-11-08-S30	3	1.09	0.66	0.06	0.85
Thiruvadandhai	02-11-08-S31	3	0.99	0.63	0.04	0.75
Thiruvadandhai	02-11-08-S32	3	0.88	0.61	0.02	0.68
Thiruvadandhai	02-11-08-S33	3	0.94	0.61	0.00	0.70
Thiruvadandhai	02-11-08-S34	3	0.93	0.66	0.02	0.84
Thiruvadandhai	02-11-08-S35	3	1.23	0.70	0.05	0.90
Thiruvadandhai	02-11-08-S36	3	1.25	0.68	0.04	0.88
Thiruvadandhai	02-11-08-S37	3	0.94	0.63	0.02	0.74
Thiruvadandhai	02-11-08-S38	3	1.15	0.68	0.04	0.84
Thiruvadandhai	02-11-08-S39	3	0.75	0.62	0.03	0.71
Thiruvadandhai	02-11-08-S40	3	0.74	0.71	0.01	0.90
Thiruvadandhai	02-11-08-S41	3	0.51	0.69	0.01	0.88
Thiruvadandhai	02-11-08-S42	3	0.61	0.65	0.03	0.84
Thiruvadandhai	02-11-08-S43	3	0.44	0.59	0.01	0.63
Thiruvadandhai	02-11-08-S44	3	0.94	0.67	0.02	0.79
Thiruvadandhai	02-11-08-S45	3	1.05	0.66	0.07	0.81
Thiruvadandhai	02-11-08-S46	3	0.69	0.67	0.03	0.84

Thiruvadandhai	02-11-08-S47	3	1.01	0.71	0.03	0.93
Thiruvadandhai	02-11-08-S48	3	0.59	0.68	0.01	0.88
Thiruvadandhai	02-11-08-S49	3	0.74	0.71	-0.02	0.93
Thiruvadandhai	02-11-08-S50	3	0.82	0.66	0.03	0.66
Thiruvadandhai	02-11-08-S51	4	0.83	0.64	0.02	0.78
Thiruvadandhai	02-11-08-S52	4	1.21	0.92	0.12	1.49
Thiruvadandhai	02-11-08-S53	5	1.07	0.71	0.02	0.95
Thiruvadandhai	02-11-08-S54	5	0.80	0.73	0.04	0.99
Thiruvadandhai	02-11-08-S55	6	0.68	0.71	0.04	0.93
Thiruvadandhai	02-11-08-S56	7	0.72	0.70	0.02	0.92
Thiruvadandhai	02-11-08-S57	8	1.14	0.72	0.06	0.95
Kovalam	02-12-08-S58	1	1.38	0.72	0.07	0.96
Kovalam	02-12-08-S59	1	1.13	0.72	0.05	0.97
Kovalam	02-12-08-S60	1	0.96	0.67	0.02	0.84
Kovalam	02-12-08-S61	1	1.33	0.73	0.02	0.92
Kovalam	02-12-08-S62	1	1.40	0.72	0.05	0.97
Kovalam	02-12-08-S63	1	1.56	0.68	0.03	0.86
Kovalam	02-12-08-S64	1	1.24	0.69	0.03	0.90
Kovalam	02-12-08-S65	1	1.59	0.61	0.05	0.67
Kovalam	02-12-08-S66	1	1.61	0.66	0.03	0.82
Mamallapuram	02-13-08-S71	2	1.35	0.64	-0.01	0.77
Mamallapuram	02-13-08-S72	2	1.38	0.71	0.05	0.95
Mamallapuram	02-13-08-S73	3	1.32	0.68	0.02	0.88
Mamallapuram	02-13-08-S74	3	1.14	0.71	0.06	0.93
Mamallapuram	02-15-08-S75	4	1.11	0.71	0.09	0.94
Mamallapuram	02-15-08-S76	4	1.11	0.69	0.06	0.88
Mamallapuram	02-15-08-S77	5	1.17	0.68	0.07	0.84
Mamallapuram	02-15-08-S78	5	1.28	0.70	0.06	0.89
Mamallapuram	02-15-08-S79	6	1.15	0.61	0.01	0.66
Mamallapuram	02-15-08-S80	6	1.33	0.65	0.01	0.79
Mamallapuram	02-15-08-S81	Dune	1.33	0.66	0.05	0.80
Mamallapuram	02-15-08-S82	1	1.00	0.63	0.01	0.74
Mamallapuram	02-15-08-S83	1	1.28	0.67	-0.02	0.86
Mamallapuram	02-15-08-S84	1	1.29	0.68	0.08	0.85
Mamallapuram	02-15-08-S85	1	1.19	0.66	0.04	0.81
Mamallapuram	02-15-08-S86	1	1.24	0.68	0.05	0.65
Mamallapuram	02-15-08-S87	1	1.14	0.65	0.04	0.76
Mamallapuram	02-15-08-S88	1	0.97	0.66	0.01	0.82
Mamallapuram	02-15-08-S89	1	1.12	0.68	0.04	0.85
Mamallapuram	02-15-08-S90	1	1.12	0.67	0.07	0.87
Mamallapuram	02-15-08-S91	1	1.01	0.65	0.02	0.78
Mamallapuram	02-15-08-S92	1	0.91	0.67	0.01	0.83
Mamallapuram	02-15-08-S93	1	1.02	0.67	0.02	0.80
Mamallapuram	02-15-08-S94	1	1.11	0.67	0.06	0.85
Mamallapuram	02-15-08-S95	1	0.95	0.64	0.03	0.75

Mamallapuram	02-15-08-S96	1	1.03	0.70	0.05	0.92
Mamallapuram	02-15-08-S97	1	1.42	0.79	0.09	1.17
Mamallapuram	02-15-08-S98	1	1.51	0.81	0.10	1.18
Mamallapuram	02-15-08-S99	1	1.38	0.79	0.08	1.18
Mamallapuram	02-15-08-S100	1	1.39	0.83	0.14	1.25
Mamallapuram	02-15-08-S101	1	1.21	0.78	0.01	1.10
Mamallapuram	02-15-08-S102	1	1.12	0.73	0.06	1.04
Vadanemelli	02-16-08-S104	1	0.82	0.85	0.13	1.42
Vadanemelli	02-16-08-S105	1	0.99	0.68	0.01	0.87
Vadanemelli	02-16-08-S106	1	0.94	0.68	0.04	0.88
Vadanemelli	02-16-08-S107	1	1.02	1.04	0.27	1.88
Vadanemelli	02-16-08-S108	1	0.74	0.66	0.03	0.84
Vadanemelli	02-16-08-S109	1	0.98	1.18	0.31	2.37
Vadanemelli	02-16-08-S110	1	0.90	0.69	0.05	0.88
Vadanemelli	02-16-08-S111	1	1.17	0.82	0.06	1.22
Vadanemelli	02-16-08-S112	1	0.93	0.73	0.08	0.98
Vadanemelli	02-16-08-S113	1	1.15	0.96	0.18	1.67
Vadanemelli	02-16-08-S114	1	0.71	0.59	-0.01	0.65
Aalikuppam	02-17-08-S115	2	1.23	0.65	0.02	0.78
Aalikuppam	02-17-08-S116	2	1.12	0.69	0.03	0.91
Aalikuppam	02-17-08-S117	3	1.04	0.71	0.03	0.94
Aalikuppam	02-17-08-S118	3	0.79	0.62	0.02	0.71
Aalikuppam	02-17-08-S119	3	1.13	0.59	0.04	0.66
Aalikuppam	02-17-08-S120	4	1.10	0.58	0.02	0.62
Aalikuppam	02-17-08-S121	4	1.18	0.60	0.05	0.63
Karikattakuppam	02-18-08-S122	1	1.59	0.58	0.02	0.62
Karikattakuppam	02-18-08-S123	1	1.58	0.56	0.00	0.61
Karikattakuppam	02-18-08-S124	2	1.38	0.63	0.04	0.74
Karikattakuppam	02-18-08-S125	3	1.35	0.75	0.05	1.06
Karikattakuppam	02-18-08-S126	3	1.30	0.82	0.08	1.22
Karikattakuppam	02-18-08-S127	4	1.46	0.70	0.06	0.90
Muttukaddu	02-18-08-S128	1	2.65	1.19	0.15	2.44
Muttukaddu	02-18-08-S129	1	2.62	0.90	-0.07	1.43
Muttukaddu	02-18-08-S130	1	3.21	1.07	0.22	1.91
Muttukaddu	02-18-08-S131	1	1.83	0.78	0.05	1.11
Muttukaddu	02-18-08-S132	1	2.49	1.50	0.24	3.92
Vailanganni	02-24-08-S133	1	2.45	0.63	0.05	0.75
Vailanganni	02-24-08-S134	1	1.74	0.91	-0.02	1.59
Vailanganni	02-24-08-S135	1	2.26	0.61	0.09	0.69
Vailanganni	02-24-08-S136	1	2.32	0.98	0.26	1.59
Vailanganni	02-24-08-S137	1	2.21	0.65	0.07	0.73
Vailanganni	02-24-08-S138	1	2.18	0.68	0.08	0.85
Vailanganni	02-24-08-S139	1	2.36	1.52	0.48	3.14
Vailanganni	02-24-08-S140	2	2.23	0.73	0.01	0.98
Vailanganni	02-24-08-S141	2	2.30	0.62	0.10	0.74

Seruthur/Vai	02-24-08-S142	3	2.55	1.11	0.26	2.17
Seruthur/Vai	02-24-08-S143	3	2.32	0.65	0.09	0.80
Seruthur/Vai	02-24-08-S144	3	2.12	0.59	0.00	0.64
Kallar	02-24-08-S145	1	2.17	0.57	0.02	0.60
Kallar	02-24-08-S146	1	1.98	0.55	0.05	0.55
Kallar	02-24-08-S147	1	2.18	0.75	-0.01	1.06
Pushpavanam	02-25-08-S148	1	2.41	0.59	0.04	0.62
Pushpavanam	02-25-08-S149	1	2.44	0.56	0.02	0.59
Vilundamavadi	02-26-08-S150	1	2.12	0.58	0.02	0.65
Vilundamavadi	02-26-08-S151	1	2.24	0.61	0.02	0.69
Puthupalli	02-26-08-S152	1	2.19	0.66	0.02	0.83
Puthupalli	02-26-08-S153	1	2.48	0.57	0.09	0.60
Karaikal	02-27-08-S154	1	2.19	0.67	0.00	0.81
Karaikal	02-27-08-S155	1	2.48	0.59	0.08	0.60
Tranquebar	02-27-08-S156	1	2.87	1.68	0.53	3.44
Tranquebar	02-27-08-S157	1	3.24	1.92	0.63	3.31
Cuddalore	02-28-08-S158	1	2.05	0.56	0.02	0.62
Cuddalore	02-28-08-S159	1	2.04	0.64	0.07	0.74
Cuddalore	02-28-08-S160	1	1.93	0.63	0.09	0.75

Appendix C

Pictures of Sites and Pits

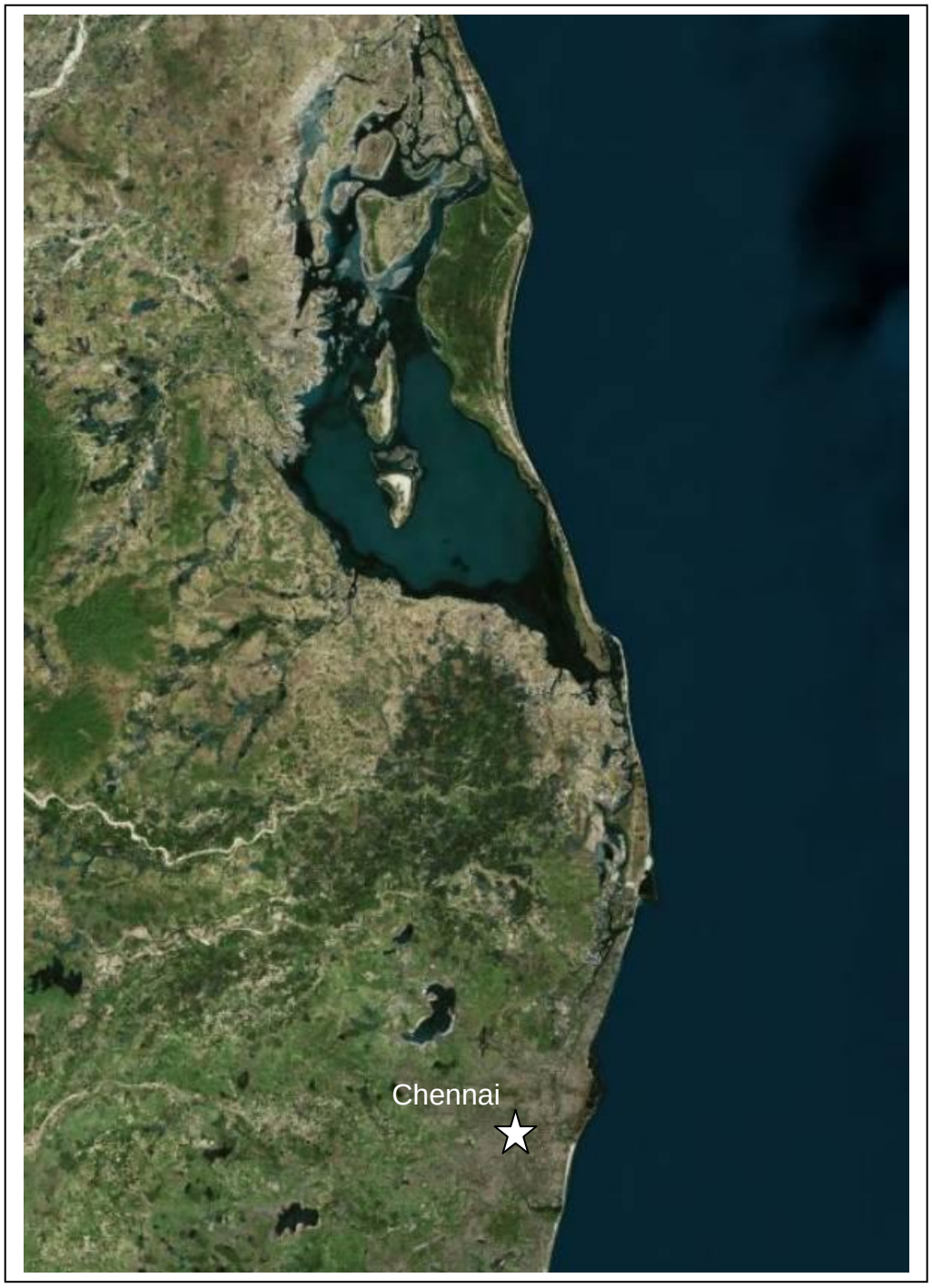


Figure C1. Satellite Image of northern site 1 Pulicat Lagoon (Google Earth).

Figure C2. Satellite Image of northern sites 2-8: 2) Karikattakuppam, 3) Muttukaddu, 4) Kovalam, 5) Thiruvadandhai, 6) Vadanemelli, 7) Mamallapuram, 8) Aalikuppam (Google Earth).

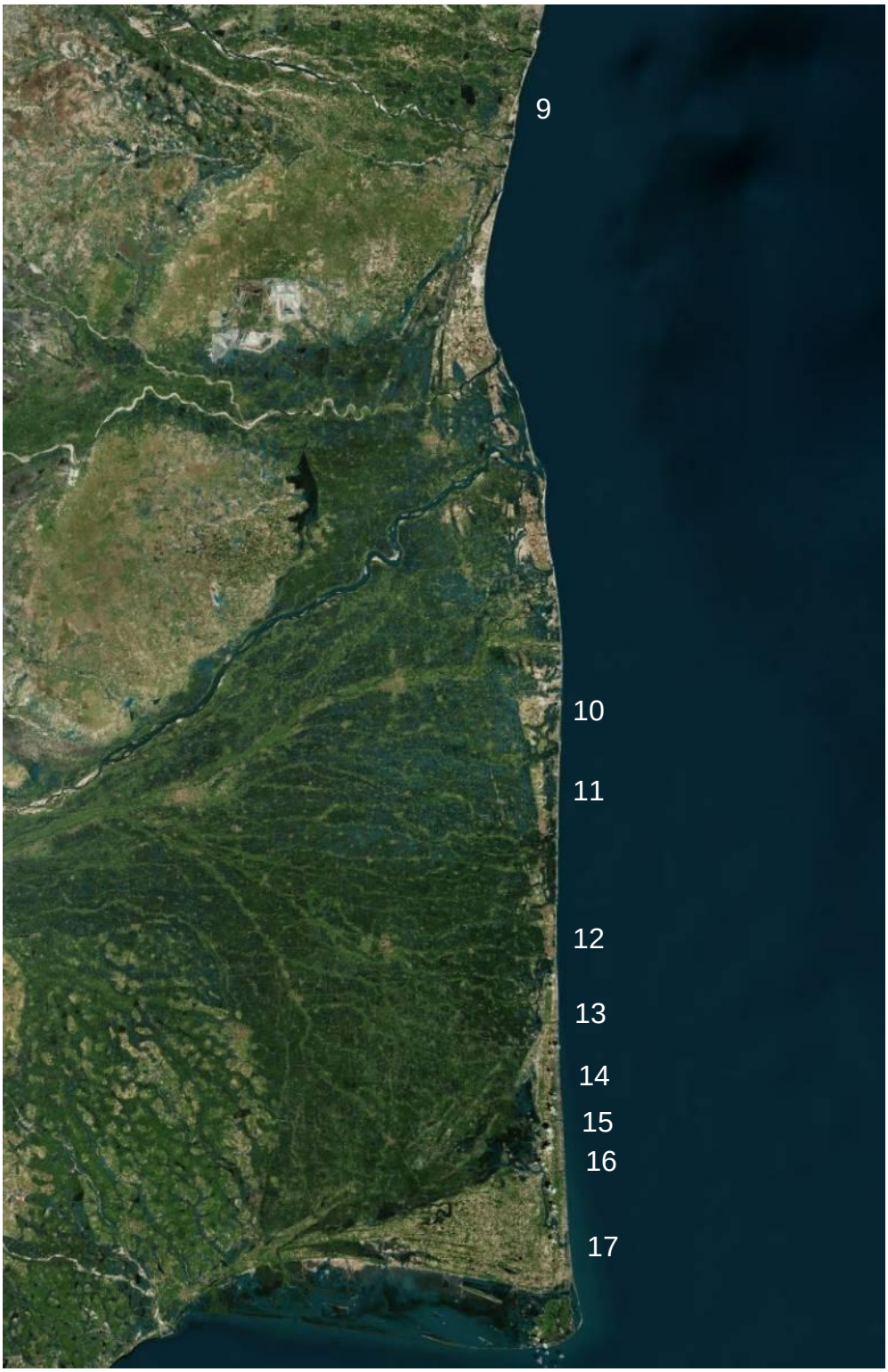


Figure C3. Satellite Image of southern sites 9-17: 9) Cuddalore, 10) Tranquebar, 11) Karaikal, 12) Kallar, 13) Vailanganni, 14) Puthupalli, 15) Vilundamavadi, 16) Pushpavanam, 17) Vedaranyam (Google Earth).

Figure C4. Tsunami-damaged house at Karikattakuppam

Figure C5. Karikattakuppam Pit 2. Note the mafic mineral laminations concentrated below the roots and near surface soil development and destruction of sediment structures despite not being present in tsunami deposits.

Figure C6. Muttukaddu Pit 1. Note the trace shells fragments within and underlying the tsunami sand.

Figure C7. Tsunami scour fan at Thiruvadandhai. Note: Anna University graduate student for scale.

Figure C8. Thiruvadandhai Pit 3. Note the mafic mineral laminations concentrated near the surface.

Figure C9. Tsunami scour fan at Vadanemelli.

Figure C10. Mamallapuram Pit 2. This pit was 200 meters from the swash zone. Note mafic mineral laminations concentrated at the bottom of the tsunami deposit.

Figure C11. Tsunami flotsam line in swale at Aalikuppam. Looking west, note the third and final landward beach ridge gently slopes up in the background of the picture.

Figure C12. Aalikuppam Pit 4. Distinct tsunami sand deposit on river terrace. Trowel is placed at the erosive lower boundary of the tsunami sand.

Figure C13. Aalikuppam seaward beach ridge laminations. Note the mafic mineral laminations concentrated near the shore despite not being present in tsunami deposits.

Figure C14. Karaikal Pit 1. Note distinct clay unit at lower boundary of tsunami deposit.

Figure C15. Uncertain tsunami boundary at Vailanganni Pit 2.

Figure C16. Vedaranyam Pit 1. Note, distinct clay deposition over 2004 tsunami deposits.

Table D1. SAMPLE LOCATION, DISTANCE INLAND AND DEPTH

Sample	*Location*	*Pit*	*Inland Distance*	*Depth (cm)*
02-09-08-S5	Aalikuppam	1	150m	0-5
02-09-08-S6	Aalikuppam	1	150m	5-9
02-09-08-S7	Aalikuppam	1	150m	10-15
02-09-08-S8	Aalikuppam	1	150m	15-20
02-09-08-S9	Aalikuppam	1	150m	20-23
02-09-08-S10	Aalikuppam	1	150m	23-30
02-09-08-S11	Aalikuppam	1	150m	30-34
02-09-08-S12	Aalikuppam	1	150m	34-40
02-09-08-S13	Aalikuppam	1	150m	40-45
02-09-08-S14	Aalikuppam	1	150m	50-55
02-09-08-S15	Aalikuppam	1	150m	60-63
02-09-08-S16	Aalikuppam	1	150m	70-75
02-09-08-S17	Aalikuppam	1	150m	80-85
02-11-08-S18	Thiruvadandhai	1	50m	10-12
02-11-08-S19	Thiruvadandhai	1	50m	7-9
02-11-08-S20	Thiruvadandhai	1	50m	13-16
02-11-08-S21	Thiruvadandhai	2	100m	0-2
02-11-08-S22	Thiruvadandhai	2	100m	2-3.5
02-11-08-S23	Thiruvadandhai	2	100m	3.5-5
02-11-08-S24	Thiruvadandhai	2	100m	6-9
02-11-08-S25	Thiruvadandhai	2	100m	9-11
02-11-08-S26	Thiruvadandhai	2	100m	16-18
02-11-08-S27	Thiruvadandhai	2	100m	20-22
02-11-08-S28	Thiruvadandhai	2	100m	30-32
02-11-08-S29	Thiruvadandhai	2	100m	38-40
02-11-08-S30	Thiruvadandhai	3	150m	0-2
02-11-08-S31	Thiruvadandhai	3	150m	2-4
02-11-08-S32	Thiruvadandhai	3	150m	4-6
02-11-08-S33	Thiruvadandhai	3	150m	6-8
02-11-08-S34	Thiruvadandhai	3	150m	8-10
02-11-08-S35	Thiruvadandhai	3	150m	10.5-11
02-11-08-S36	Thiruvadandhai	3	150m	11-13
02-11-08-S37	Thiruvadandhai	3	150m	13-15
02-11-08-S38	Thiruvadandhai	3	150m	15-17
02-11-08-S39	Thiruvadandhai	3	150m	17-19
02-11-08-S40	Thiruvadandhai	3	150m	19-21
02-11-08-S41	Thiruvadandhai	3	150m	21-23
02-11-08-S42	Thiruvadandhai	3	150m	24-26
02-11-08-S43	Thiruvadandhai	3	150m	26-28
02-11-08-S44	Thiruvadandhai	3	150m	28-30
02-11-08-S45	Thiruvadandhai	3	150m	30-32
02-11-08-S46	Thiruvadandhai	3	150m	32-33
02-11-08-S47	Thiruvadandhai	3	150m	33-35
02-11-08-S48	Thiruvadandhai	3	150m	35-40
02-11-08-S49	Thiruvadandhai	3	150m	40-45
02-11-08-S50	Thiruvadandhai	3	150m	45-50
02-11-08-S51	Thiruvadandhai	4	200m	10-14

02-11-08-S52	Thiruvadandhai	4	200m	20-25
02-11-08-S53	Thiruvadandhai	5	250m	0-5
02-11-08-S54	Thiruvadandhai	5	250m	15-20
02-11-08-S55	Thiruvadandhai	6	280m	0-3
02-11-08-S56	Thiruvadandhai	7	300m	0-2
02-11-08-S57	Thiruvadandhai	8	300+m	0-5
02-12-08-S58	Kovalam	1	40m	2-4
02-12-08-S59	Kovalam	1	40m	4-7
02-12-08-S60	Kovalam	1	40m	7-10
02-12-08-S61	Kovalam	1	40m	10-12
02-12-08-S62	Kovalam	1	40m	12-14
02-12-08-S63	Kovalam	1	40m	15-18
02-12-08-S64	Kovalam	1	40m	18-20
02-12-08-S65	Kovalam	1	40m	20-22
02-12-08-S66	Kovalam	1	40m	22-25
02-13-08-S71	Mamallapuram	2	200m	16-18
02-13-08-S72	Mamallapuram	2	200m	28-30
02-13-08-S73	Mamallapuram	3	250m	6-8
02-13-08-S74	Mamallapuram	3	250m	36-39
02-15-08-S75	Mamallapuram	4	350m	0-3
02-15-08-S76	Mamallapuram	4	350m	8-11
02-15-08-S77	Mamallapuram	5	450m	0-1
02-15-08-S78	Mamallapuram	5	450m	14-17
02-15-08-S79	Mamallapuram	6	500m	0-0.5
02-15-08-S80	Mamallapuram	6	500m	10-13
02-15-08-S81	Mamallapuram	Dune	570m	0-2
02-15-08-S82	Mamallapuram	1	120m	0-2
02-15-08-S83	Mamallapuram	1	120m	2-4
02-15-08-S84	Mamallapuram	1	120m	4-6
02-15-08-S85	Mamallapuram	1	120m	6-8
02-15-08-S86	Mamallapuram	1	120m	8-10
02-15-08-S87	Mamallapuram	1	120m	10-12
02-15-08-S88	Mamallapuram	1	120m	12-14
02-15-08-S89	Mamallapuram	1	120m	14-16
02-15-08-S90	Mamallapuram	1	120m	16-18
02-15-08-S91	Mamallapuram	1	120m	18-20
02-15-08-S92	Mamallapuram	1	120m	20-22
02-15-08-S93	Mamallapuram	1	120m	22-24
02-15-08-S94	Mamallapuram	1	120m	24-26
02-15-08-S95	Mamallapuram	1	120m	26-28
02-15-08-S96	Mamallapuram	1	120m	28-30
02-15-08-S97	Mamallapuram	1	120m	30-32
02-15-08-S98	Mamallapuram	1	120m	32-34
02-15-08-S99	Mamallapuram	1	120m	34-36
02-15-08-S100	Mamallapuram	1	120m	36-38
02-15-08-S101	Mamallapuram	1	120m	38-40
02-15-08-S102	Mamallapuram	1	120m	40-42
02-16-08-S104	Vadanemelli	1	100m	3-5
02-16-08-S105	Vadanemelli	1	100m	5-7
02-16-08-S106	Vadanemelli	1	100m	7-9

02-16-08-S107	Vadanemelli	1	100m	9-11
02-16-08-S108	Vadanemelli	1	100m	11-13
02-16-08-S109	Vadanemelli	1	100m	14-15
02-16-08-S110	Vadanemelli	1	100m	18-20
02-16-08-S111	Vadanemelli	1	100m	22-23
02-16-08-S112	Vadanemelli	1	100m	24-26
02-16-08-S113	Vadanemelli	1	100m	28-29
02-16-08-S114	Vadanemelli	1	100m	31-34
02-17-08-S115	Aalikuppam	2	200m	0-2
02-17-08-S116	Aalikuppam	2	200m	20-23
02-17-08-S117	Aalikuppam	3	350m	0-3
02-17-08-S118	Aalikuppam	3	350m	17-19
02-17-08-S119	Aalikuppam	3	350m	35-40
02-17-08-S120	Aalikuppam	4	100m	10-12
02-17-08-S121	Aalikuppam	4	100m	4-6
02-18-08-S122	Karikattakuppam	1	50m	6-9
02-18-08-S123	Karikattakuppam	1	50m	20-23
02-18-08-S124	Karikattakuppam	2	100m	11-13
02-18-08-S125	Karikattakuppam	3	150m	0-2
02-18-08-S126	Karikattakuppam	3	150m	9-11
02-18-08-S127	Karikattakuppam	4	200m	5-10
02-18-08-S128	Muttukaddu	1		0.5-2.5
02-18-08-S129	Muttukaddu	1		4.5-5.5
02-18-08-S130	Muttukaddu	1		5.5-7.5
02-18-08-S131	Muttukaddu	1		7.5-8.5
02-18-08-S132	Muttukaddu	1		19-22
02-24-08-S133	Vailanganni	1	350m	1-4
02-24-08-S134	Vailanganni	1	350m	6-10
02-24-08-S135	Vailanganni	1	350m	19-22
02-24-08-S136	Vailanganni	1	350m	41-44
02-24-08-S137	Vailanganni	1	350m	58-61
02-24-08-S138	Vailanganni	1	350m	74-77
02-24-08-S139	Vailanganni	1	350m	84-87
02-24-08-S140	Vailanganni	2	380m	1-4
02-24-08-S141	Vailanganni	2	380m	10-13
02-24-08-S142	Vailanganni	3	380m	1-4
02-24-08-S143	Vailanganni	3	380m	31-34
02-24-08-S144	Vailanganni	3	380m	57-60
02-24-08-S145	Kallar	1		0-4
02-24-08-S146	Kallar	1		29-32
02-24-08-S147	Kallar	1		100-103
02-25-08-S148	Pushpavanam	1	300m	19-22
02-25-08-S149	Pushpavanam	1	300m	37-40
02-26-08-S150	Vilundamavadi	1	150m	14-17
02-26-08-S151	Vilundamavadi	1	150m	32-35
02-26-08-S152	Puthupalli	1	500m	8-11
02-26-08-S153	Puthupalli	1	500m	25-28
02-27-08-S154	Karaikal	1	200m	5-8
02-27-08-S155	Karaikal	1	200m	29-32
02-27-08-S156	Tranquebar	1	900m	6-9

02-27-08-S157	Tranquebar	1	900m	34-37
02-28-08-S158	Cuddalore	1	400m	3-5
02-28-08-S159	Cuddalore	1	400m	15-18
02-28-08-S160	Cuddalore	1	400m	34-37

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S5 - Average

SOP Name:

Measured:
Tuesday, October 21, 2008 10:47:32 AM

Sample Source & type:
Aalikuppam

Measured by:
student

Analysed:
Tuesday, October 21, 2008 10:47:34 AM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
21.22 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.058 %

Result Emulation:
Off

Concentration:
1.2784 %Vol

Span :
1.317

Uniformity:
0.407

Result units:
Volume

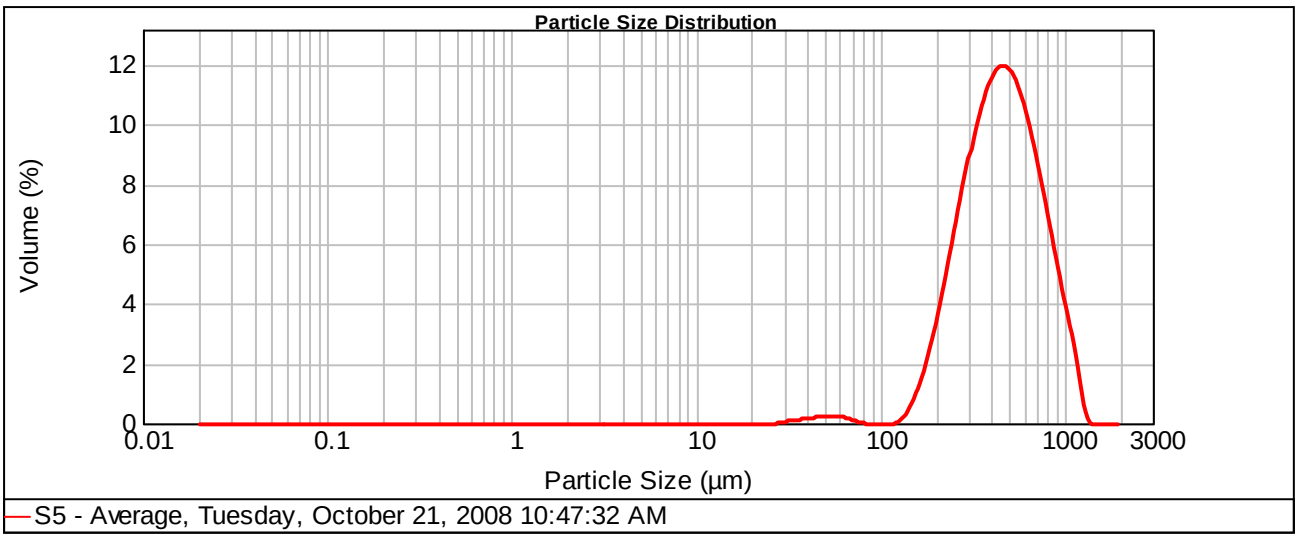
Specific Surface Area:
0.0159 m²/g

Surface Weighted Mean D[3,2]:
377.919 um

Vol. Weighted Mean D[4,3]:
498.651 um

d(0.1): 239.145 um **d(0.5):** 453.097 um **d(0.9):** 835.966 um

---



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.08	1258.925	0.07
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.60	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	1.45	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	2.69	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	4.24	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	6.01	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.02	275.423	7.75	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.08	316.228	9.28	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.13	363.078	10.34	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.17	416.869	10.80	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.21	478.630	10.58	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.21	549.541	9.74	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.17	630.957	8.40	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.05	724.436	6.77	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	-0.00	831.764	5.04	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	3.39	10000.000	
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	1.71		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S6 - Average

SOP Name:

Measured:
Tuesday, October 21, 2008 4:55:13 PM

Sample Source & type:
Aalikuppam

Measured by:
student

Analysed:
Tuesday, October 21, 2008 4:55:14 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
21.98 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.893 %

Result Emulation:
Off

Concentration:
1.1688 %Vol

Span :
1.320

Uniformity:
0.407

Result units:
Volume

Specific Surface Area:
0.0181 m²/g

Surface Weighted Mean D[3,2]:
332.132 um

Vol. Weighted Mean D[4,3]:
437.885 um

d(0.1): 208.481 um **d(0.5):** 398.284 um **d(0.9):** 734.117 um

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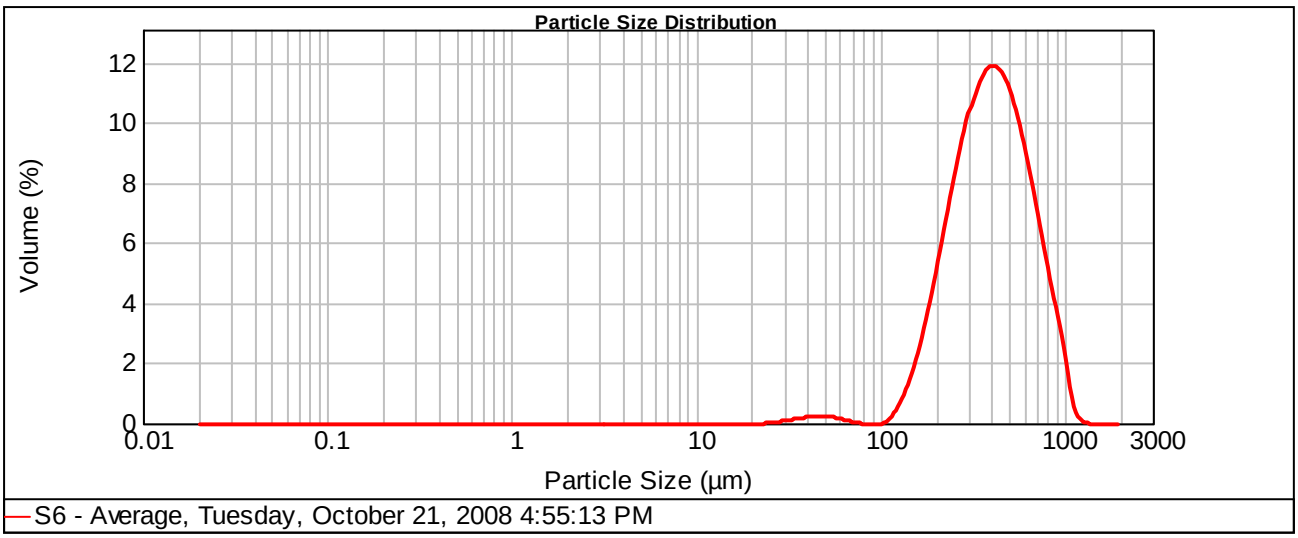

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.65	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	1.47	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	2.65	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	4.16	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	5.86	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	7.59	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.01	275.423	9.10	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.06	316.228	10.21	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.11	363.078	10.73	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.16	416.869	10.59	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.20	478.630	9.82	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.21	549.541	8.54	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.17	630.957	6.92	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.10	724.436	5.16	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.01	831.764	3.50	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	1.73	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	0.19		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.11	1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S7 - Average

SOP Name:

Measured:
Tuesday, October 21, 2008 5:04:33 PM

Sample Source & type:
Aalikuppam

Measured by:
student

Analysed:
Tuesday, October 21, 2008 5:04:34 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
19.80 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.013 %

Result Emulation:
Off

Concentration:
1.1821 %Vol

Span :
1.358

Uniformity:
0.417

Result units:
Volume

Specific Surface Area:
0.0159 m²/g

Surface Weighted Mean D[3,2]:
377.191 um

Vol. Weighted Mean D[4,3]:
473.071 um

d(0.1): 223.499 um **d(0.5):** 424.663 um **d(0.9):** 800.062 um

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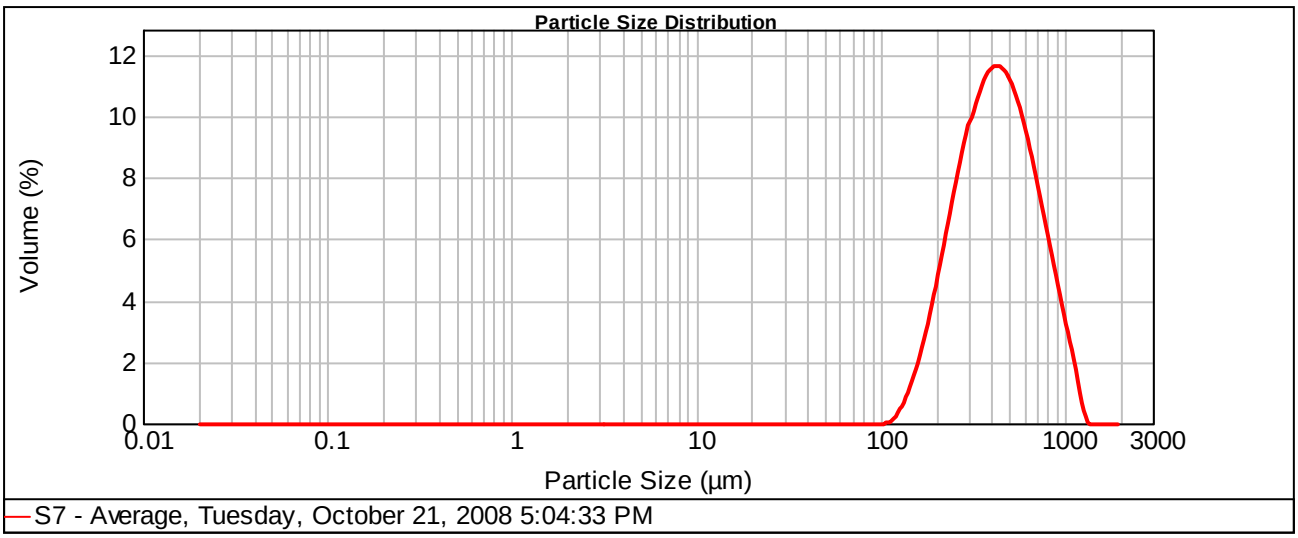

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.44	1258.925	0.02
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	1.18	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	2.27	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	3.69	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	5.31	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	7.00	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	8.53	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	9.72	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	10.40	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	10.49	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	9.98	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	8.95	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	7.55	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	5.96	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	4.35	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	2.83	10000.000	
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.04	1096.478	1.29		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S8 - Average

SOP Name:

Measured:
Tuesday, October 21, 2008 5:15:41 PM

Sample Source & type:
Aalikuppam

Measured by:
student

Analysed:
Tuesday, October 21, 2008 5:15:42 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
20.52 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.067 %

Result Emulation:
Off

Concentration:
1.2687 %Vol

Span :
1.311

Uniformity:
0.404

Result units:
Volume

Specific Surface Area:
0.0154 m²/g

Surface Weighted Mean D[3,2]:
389.102 um

Vol. Weighted Mean D[4,3]:
480.555 um

d(0.1): 233.735 um **d(0.5):** 433.749 um **d(0.9):** 802.388 um

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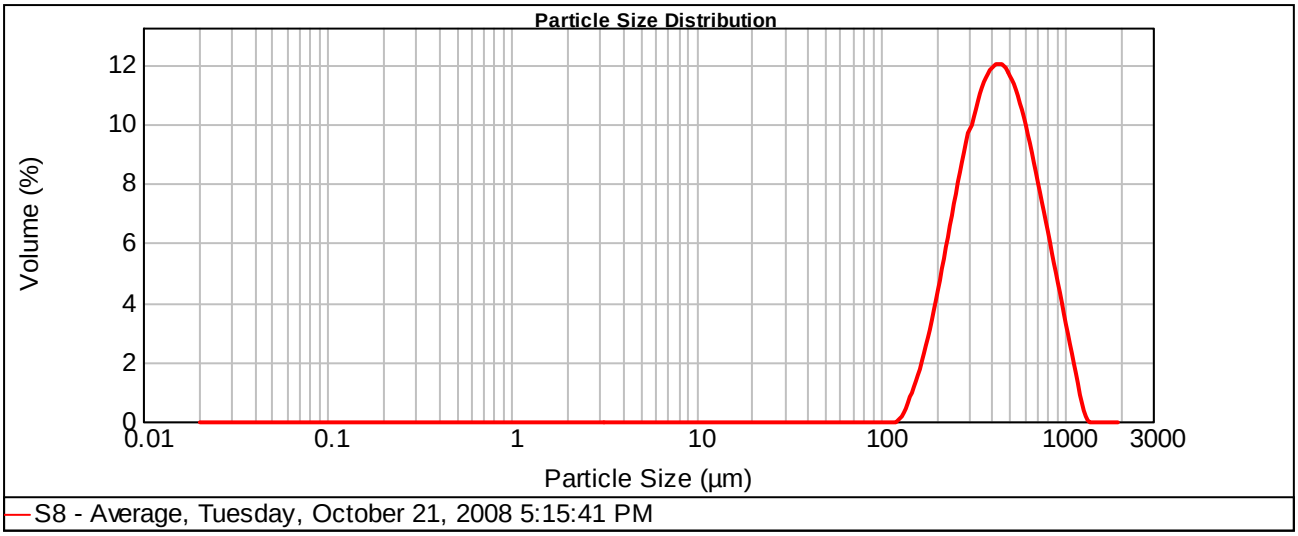


Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.08	1258.925	0.02
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.85	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	1.85	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	3.30	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	4.99	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	6.80	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	8.49	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	9.85	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	10.66	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	10.84	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	10.36	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	9.31	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	7.86	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	6.21	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	4.52	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	2.85	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	1.16		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	0.00		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S9 - Average

SOP Name:

Measured:
Tuesday, October 21, 2008 5:23:25 PM

Sample Source & type:
Aalikuppam

Measured by:
student

Analysed:
Tuesday, October 21, 2008 5:23:27 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
17.91 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.161 %

Result Emulation:
Off

Concentration:
1.1747 %Vol

Span :
1.320

Uniformity:
0.403

Result units:
Volume

Specific Surface Area:
0.0143 m²/g

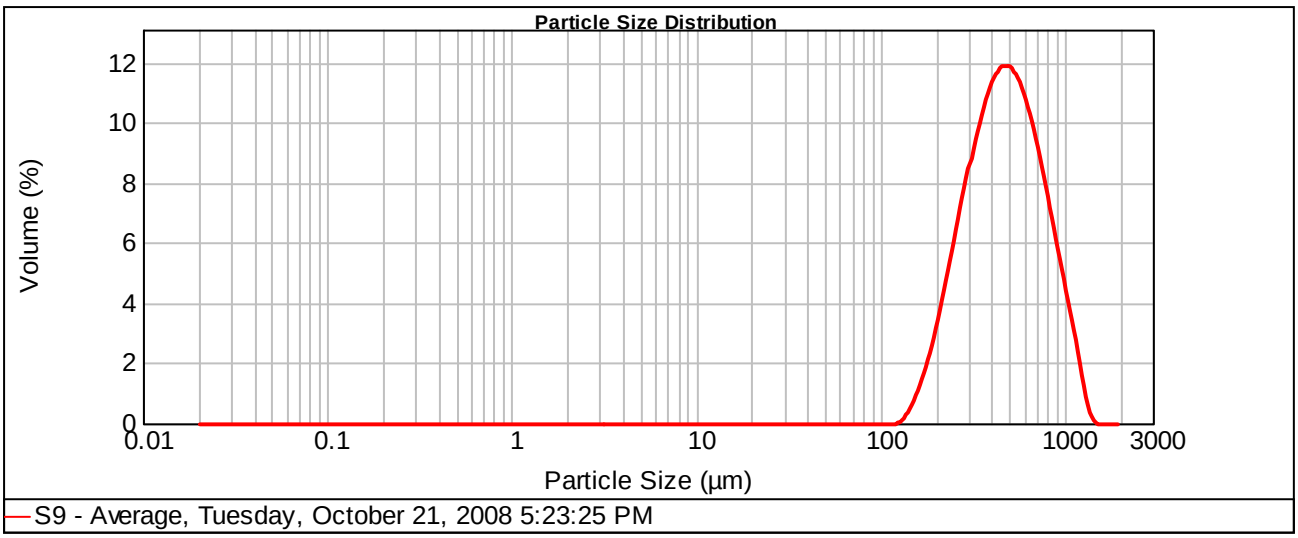
Surface Weighted Mean D[3,2]:
419.208 um

Vol. Weighted Mean D[4,3]:
520.825 um

---

d(0.1): 250.040 um **d(0.5):** 470.904 um **d(0.9):** 871.609 um

---



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.05	1258.925	0.44
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.54	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	1.34	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	2.53	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	4.01	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	5.71	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	7.41	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	8.94	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	10.08	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	10.67	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	10.63	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	9.98	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	8.80	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	7.25	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	5.55	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	3.88	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	2.20		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S10 - Average

SOP Name:

Measured:
Tuesday, October 21, 2008 5:31:27 PM

Sample Source & type:
Aalikuppam

Measured by:
student

Analysed:
Tuesday, October 21, 2008 5:31:29 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
16.83 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.240 %

Result Emulation:
Off

Concentration:
1.1477 %Vol

Span :
1.272

Uniformity:
0.39

Result units:
Volume

Specific Surface Area:
0.0137 m²/g

Surface Weighted Mean D[3,2]:
438.694 um

Vol. Weighted Mean D[4,3]:
536.581 um

d(0.1): 265.655 um **d(0.5):** 487.670 um **d(0.9):** 885.904 um

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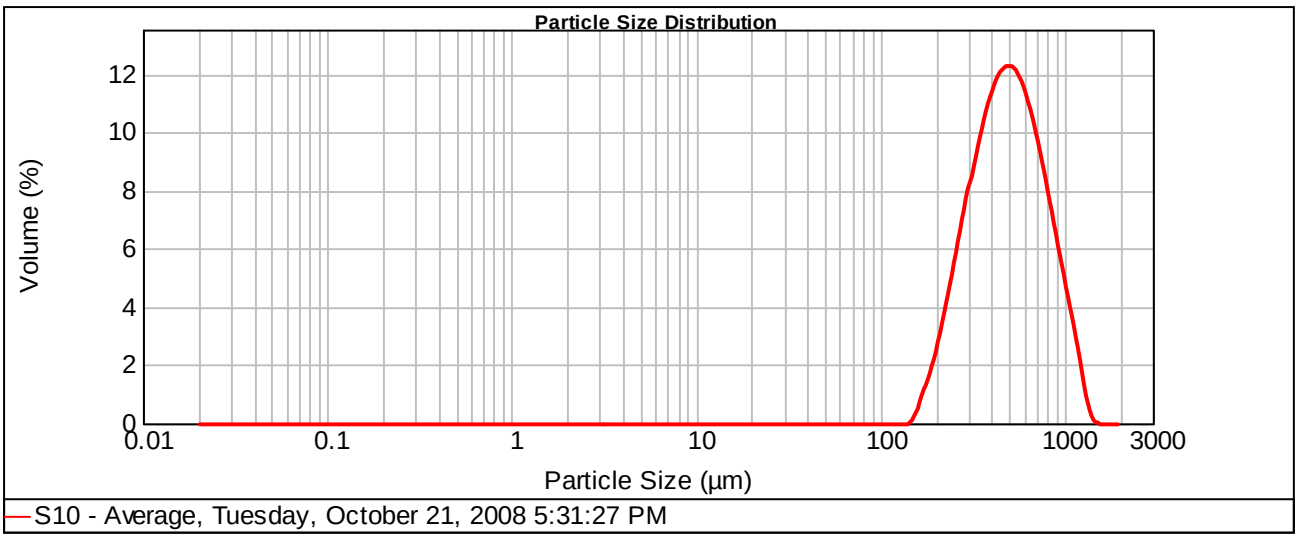

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	0.51
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.07	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	0.91	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	1.95	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	3.43	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	5.19	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	7.04	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	8.79	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	10.16	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	10.96	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	11.08	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	10.50	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	9.31	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	7.70	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	5.90	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	4.14	10000.000	
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	2.36		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S11 - Average

SOP Name:

Measured:
Tuesday, October 21, 2008 5:43:13 PM

Sample Source & type:
Aalikuppam

Measured by:
student

Analysed:
Tuesday, October 21, 2008 5:43:14 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
18.66 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.209 %

Result Emulation:
Off

Concentration:
1.2759 %Vol

Span :
1.127

Uniformity:
0.344

Result units:
Volume

Specific Surface Area:
0.0138 m²/g

Surface Weighted Mean D[3,2]:
435.099 um

Vol. Weighted Mean D[4,3]:
513.126 um

d(0.1): 275.237 um **d(0.5):** 474.654 um **d(0.9):** 810.323 um

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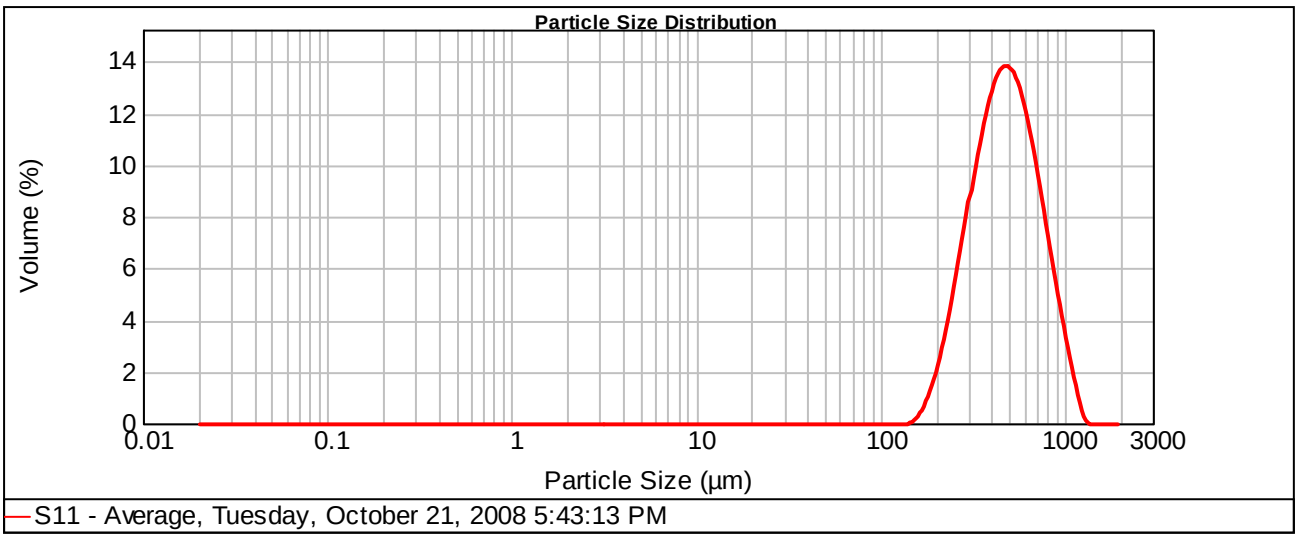

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	0.01
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.03	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	0.50	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	1.47	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	2.99	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	5.03	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	7.34	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	9.60	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	11.40	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	12.39	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	12.36	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	11.33	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	9.50	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	7.23	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	4.92	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	2.86	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	1.02		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	0.01		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S12 - Average

SOP Name:

Measured:
Tuesday, October 21, 2008 5:53:45 PM

Sample Source & type:
Aalikuppam

Measured by:
student

Analysed:
Tuesday, October 21, 2008 5:53:47 PM

Sample bulk lot ref:
Pit1

Result Source:
Edited

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
15.69 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.517 %

Result Emulation:
Off

Concentration:
1.2008 %Vol

Span :
1.318

Uniformity:
0.402

Result units:
Volume

Specific Surface Area:
0.0121 m²/g

Surface Weighted Mean D[3,2]:
495.284 um

Vol. Weighted Mean D[4,3]:
614.508 um

d(0.1): 296.110 um **d(0.5):** 555.240 um **d(0.9):** 1027.727 um

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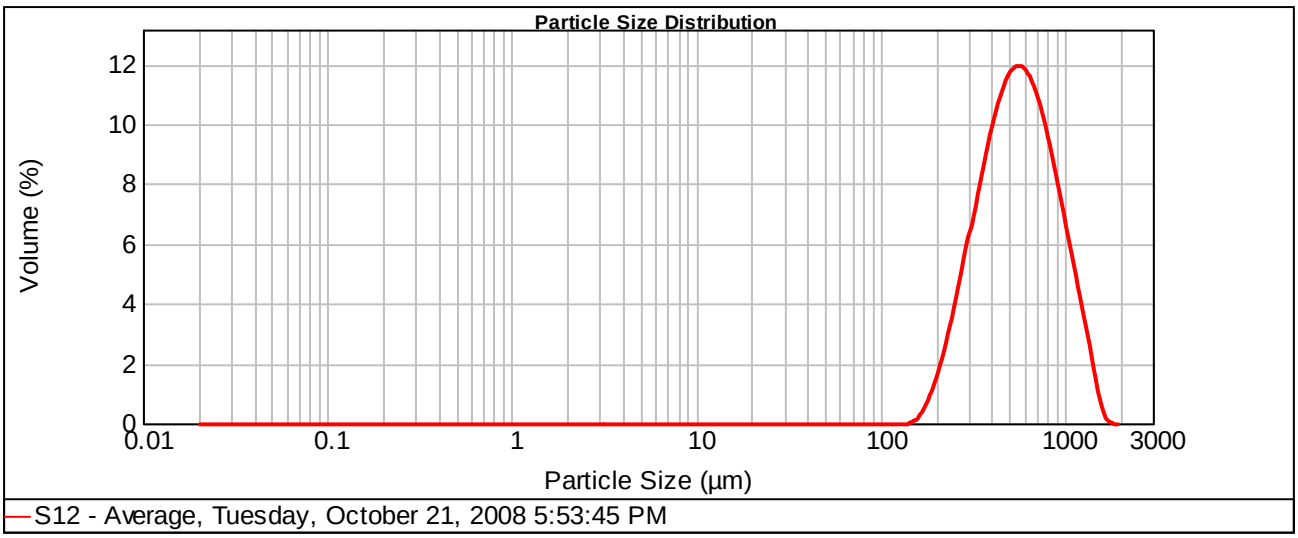

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	2.52
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.02	1445.440	0.75
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	0.37	1659.587	0.02
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	1.12	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	2.22	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	3.68	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	5.35	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	7.10	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	8.70	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	9.96	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	10.67	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	10.74	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	10.17	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	9.04	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	7.53	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	5.85	10000.000	
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	4.17		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S13 - Average

SOP Name:

Measured:
Tuesday, October 21, 2008 6:03:25 PM

Sample Source & type:
Aalikuppam

Measured by:
student

Analysed:
Tuesday, October 21, 2008 6:03:27 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
15.28 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.745 %

Result Emulation:
Off

Concentration:
1.2369 %Vol

Span :
1.330

Uniformity:
0.409

Result units:
Volume

Specific Surface Area:
0.0114 m²/g

Surface Weighted Mean D[3,2]:
525.368 um

Vol. Weighted Mean D[4,3]:
654.415 um

d(0.1): 313.081 um **d(0.5):** 590.649 um **d(0.9):** 1098.642 um

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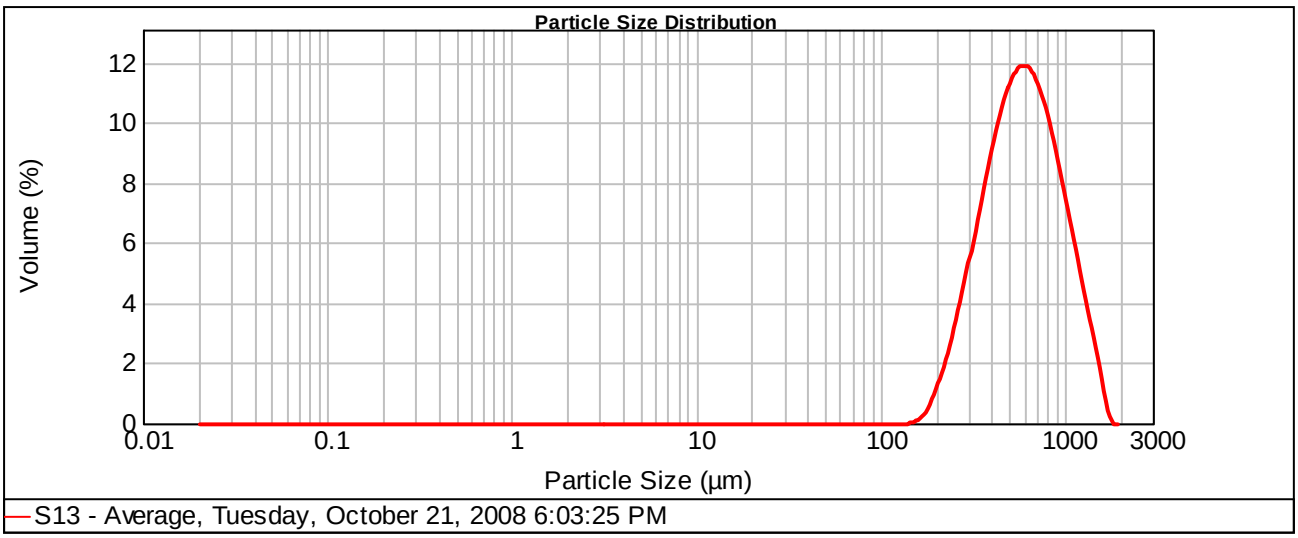

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	3.30
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.02	1445.440	1.73
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	0.19	1659.587	0.12
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	0.84	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	1.74	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	3.02	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	4.57	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	6.29	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	7.96	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	9.39	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	10.36	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	10.74	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	10.46	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	9.56	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	8.19	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	6.57	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	4.93		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	3.30		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S14 - Average

SOP Name:

Measured:
Tuesday, October 21, 2008 6:12:52 PM

Sample Source & type:
Aalikuppam

Measured by:
student

Analysed:
Tuesday, October 21, 2008 6:12:53 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
17.03 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.243 %

Result Emulation:
Off

Concentration:
1.0946 %Vol

Span :
1.236

Uniformity:
0.38

Result units:
Volume

Specific Surface Area:
0.0145 m²/g

Surface Weighted Mean D[3,2]:
413.040 um

Vol. Weighted Mean D[4,3]:
500.740 um

d(0.1): 252.465 um **d(0.5):** 457.482 um **d(0.9):** 817.920 um

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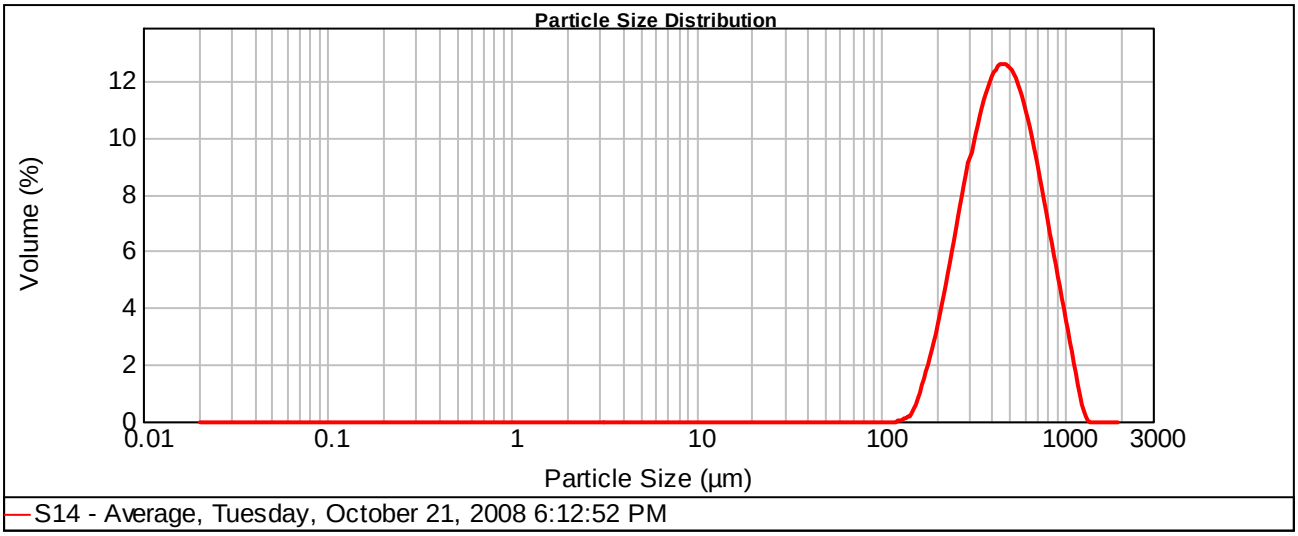


Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.03	1258.925	0.02
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.24	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	1.20	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	2.44	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	4.10	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	6.00	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	7.92	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	9.62	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	10.82	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	11.37	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	11.15	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	10.23	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	8.73	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	6.89	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	4.96	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	3.09	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	1.20		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	0.03		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S15 - Average

SOP Name:

Measured:
Tuesday, October 21, 2008 6:27:30 PM

Sample Source & type:
Aalikuppam

Measured by:
student

Analysed:
Tuesday, October 21, 2008 6:27:31 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
16.39 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.044 %

Result Emulation:
Off

Concentration:
0.9403 %Vol

Span :
1.123

Uniformity:
0.344

Result units:
Volume

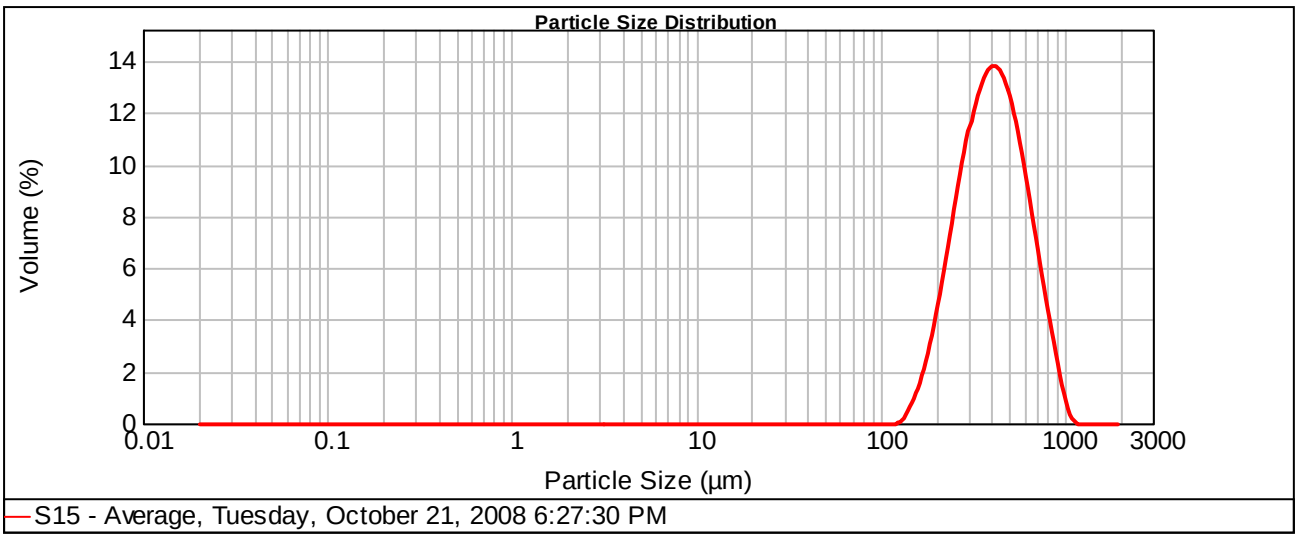
Specific Surface Area:
0.0162 m²/g

Surface Weighted Mean D[3,2]:
369.904 um

Vol. Weighted Mean D[4,3]:
436.083 um

d(0.1): 233.803 um **d(0.5):** 404.170 um **d(0.9):** 687.683 um

---



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.06	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.68	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	1.71	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	3.34	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	5.40	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	7.72	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	9.89	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	11.59	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	12.43	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	12.27	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	11.12	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	9.21	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	6.91	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	4.58	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	2.45	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	0.64	10000.000	
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	0.00		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S16 - Average

SOP Name:

Measured:
Tuesday, October 21, 2008 6:37:56 PM

Sample Source & type:
Aalikuppam

Measured by:
student

Analysed:
Tuesday, October 21, 2008 6:37:58 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
17.20 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.963 %

Result Emulation:
Off

Concentration:
0.9484 %Vol

Span :
1.179

Uniformity:
0.365

Result units:
Volume

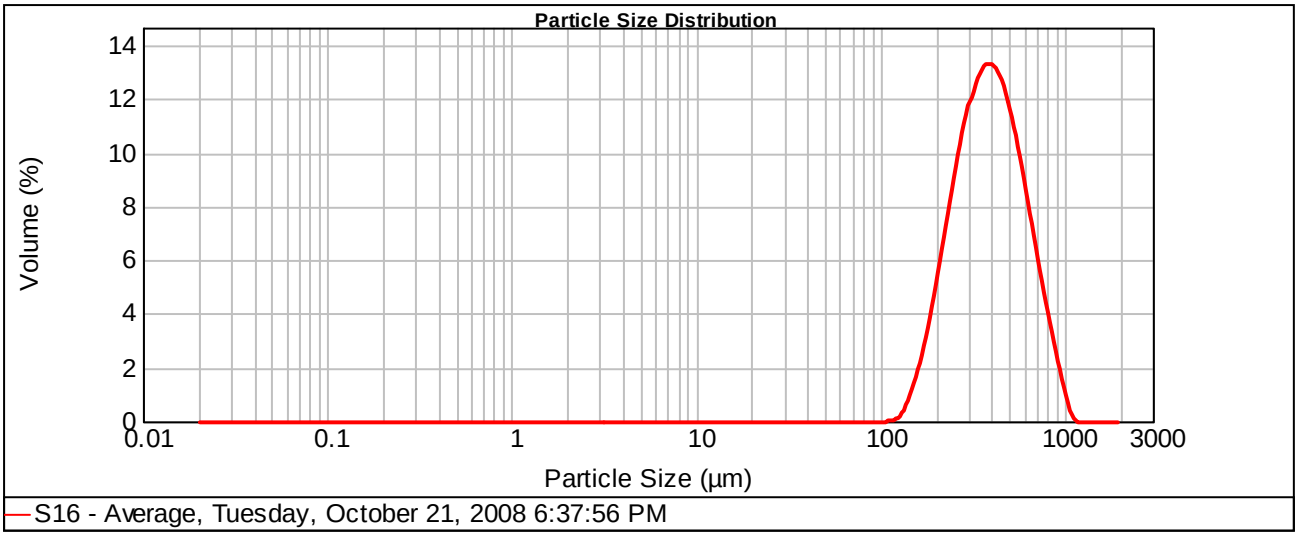
Specific Surface Area:
0.0169 m²/g

Surface Weighted Mean D[3,2]:
353.986 um

Vol. Weighted Mean D[4,3]:
422.398 um

d(0.1): 221.255 um **d(0.5):** 387.218 um **d(0.9):** 677.704 um

---



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.19	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	1.04	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	2.30	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	4.12	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	6.25	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	8.47	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	10.36	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	11.63	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	12.04	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	11.53	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	10.22	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	8.34	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	6.23	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	4.17	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	2.35	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	0.74	10000.000	
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.02	1096.478	0.00		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S17 - Average

SOP Name:

Measured:
Tuesday, October 21, 2008 6:49:06 PM

Sample Source & type:
Aalikuppam

Measured by:
student

Analysed:
Tuesday, October 21, 2008 6:49:07 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
17.81 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.420 %

Result Emulation:
Off

Concentration:
1.2606 %Vol

Span :
1.232

Uniformity:
0.38

Result units:
Volume

Specific Surface Area:
0.0133 m²/g

Surface Weighted Mean D[3,2]:
452.605 um

Vol. Weighted Mean D[4,3]:
550.278 um

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d(0.1): 274.928 um **d(0.5):** 505.252 um **d(0.9):** 897.357 um

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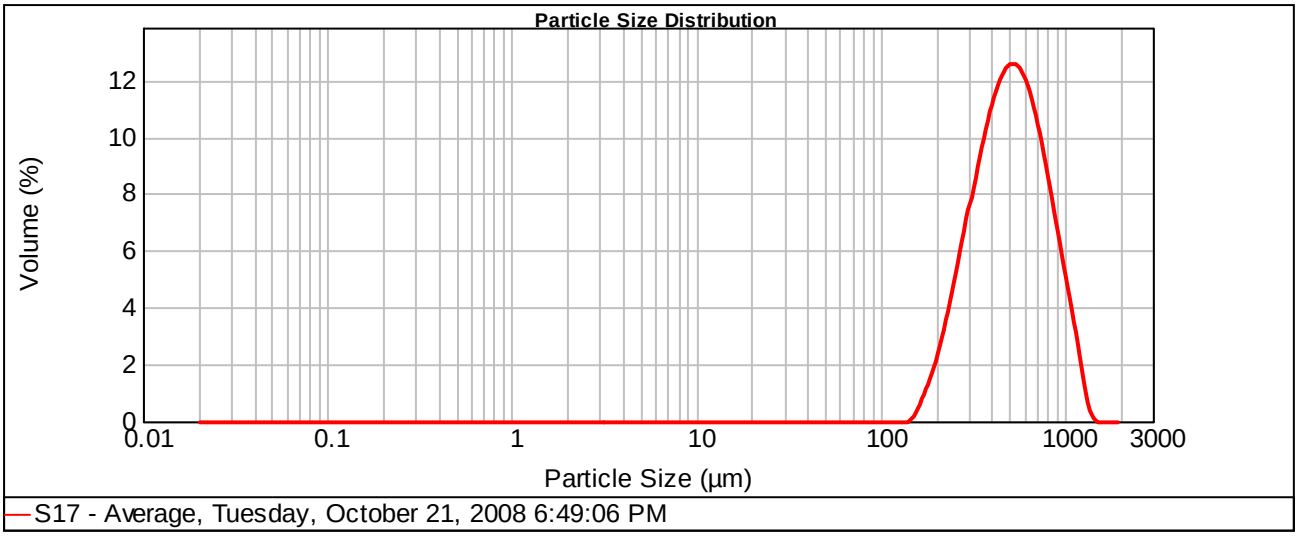

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	0.49
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.05	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	0.75	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	1.66	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	2.98	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	4.63	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	6.44	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	8.27	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	9.84	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	10.93	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	11.36	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	11.03	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	9.97	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	8.33	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	6.37	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	4.41	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	2.48		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	0.49		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S18 - Average

SOP Name:

Measured:
Sunday, October 19, 2008 4:20:14 PM

Sample Source & type:
Thiruvadandhai

Measured by:
student

Analysed:
Sunday, October 19, 2008 4:20:16 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
17.33 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.191 %

Result Emulation:
Off

Concentration:
1.3695 %Vol

Span :
1.090

Uniformity:
0.334

Result units:
Volume

Specific Surface Area:
0.0118 m²/g

Surface Weighted Mean D[3,2]:
506.877 um

Vol. Weighted Mean D[4,3]:
591.695 um

d(0.1): 325.176 um **d(0.5):** 548.879 um **d(0.9):** 923.373 um

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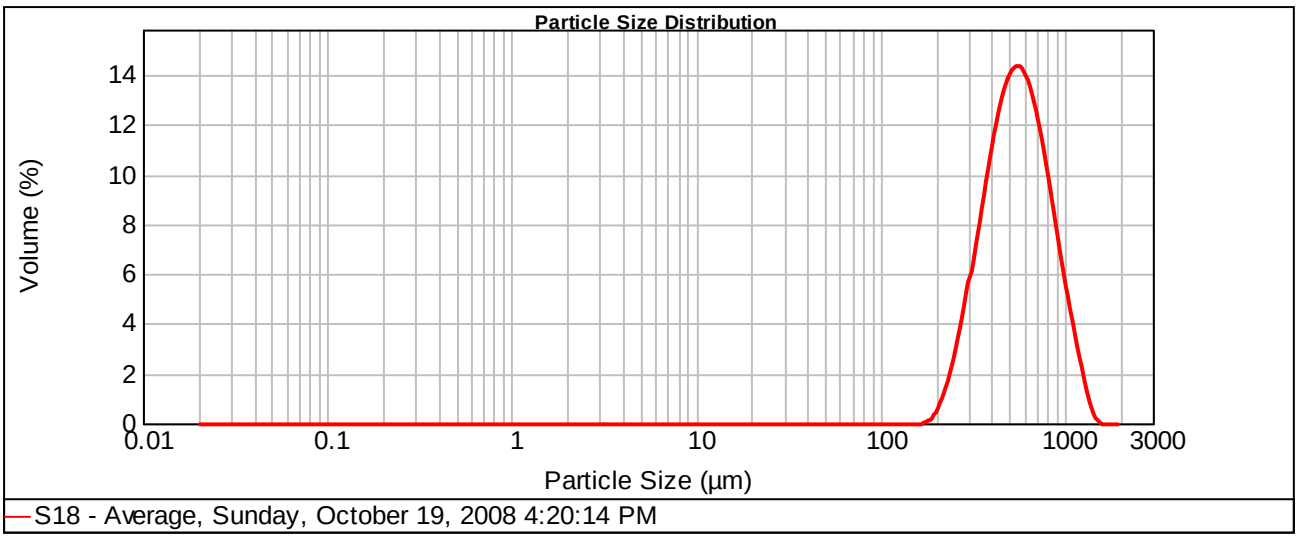

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	0.92
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.00	1445.440	0.02
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	0.00	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	0.27	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	1.14	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	2.64	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	4.71	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	7.18	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	9.65	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	11.69	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	12.83	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	12.83	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	11.69	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	9.67	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	7.21	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	4.79	10000.000	
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	2.74		
0.105		1.096		11.482		120.226		1258.925			

Operator notes: *We did not sample from top down in this one:*
S18= 10-12cm
S19= 7-9

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S19 - Average

SOP Name:

Measured:
Sunday, October 19, 2008 4:28:52 PM

Sample Source & type:
Thiruvadandhai

Measured by:
student

Analysed:
Sunday, October 19, 2008 4:28:54 PM

Sample bulk lot ref:
Pit1

Result Source:
Edited

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
16.15 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.937 %

Result Emulation:
Off

Concentration:
1.0580 %Vol

Span :
1.231

Uniformity:
0.376

Result units:
Volume

Specific Surface Area:
0.0142 m²/g

Surface Weighted Mean D[3,2]:
423.181 um

Vol. Weighted Mean D[4,3]:
514.211 um

d(0.1): 257.872 um **d(0.5):** 471.693 um **d(0.9):** 838.627 um

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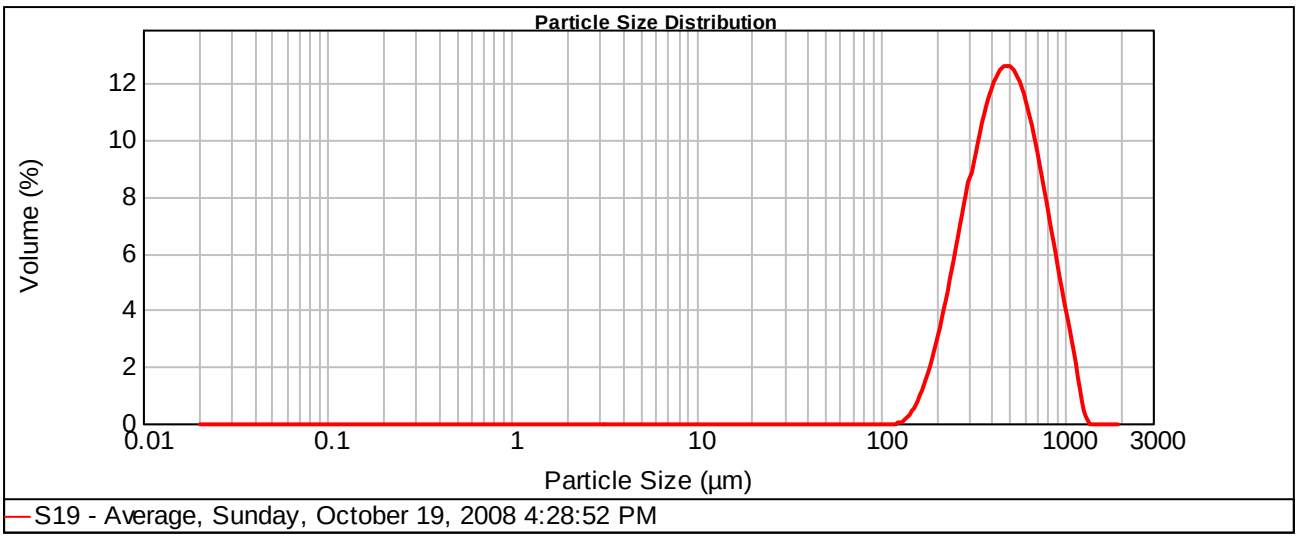


Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.02	1258.925	0.02
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.36	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	1.08	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	2.21	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	3.69	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	5.49	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	7.38	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	9.15	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	10.53	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	11.30	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	11.32	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	10.57	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	9.18	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	7.35	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	5.36	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	3.46	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	1.53		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	0.00		

Operator notes: *We did not sample from top down in this one:*
S18= 10-12cm
S19= 7-9

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S20 - Average

SOP Name:

Measured:
Sunday, October 19, 2008 4:36:36 PM

Sample Source & type:
Thiruvadandhai

Measured by:
student

Analysed:
Sunday, October 19, 2008 4:36:37 PM

Sample bulk lot ref:
Pit1

Result Source:
Edited

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
16.95 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.911 %

Result Emulation:
Off

Concentration:
1.1542 %Vol

Span :
1.110

Uniformity:
0.34

Result units:
Volume

Specific Surface Area:
0.0137 m²/g

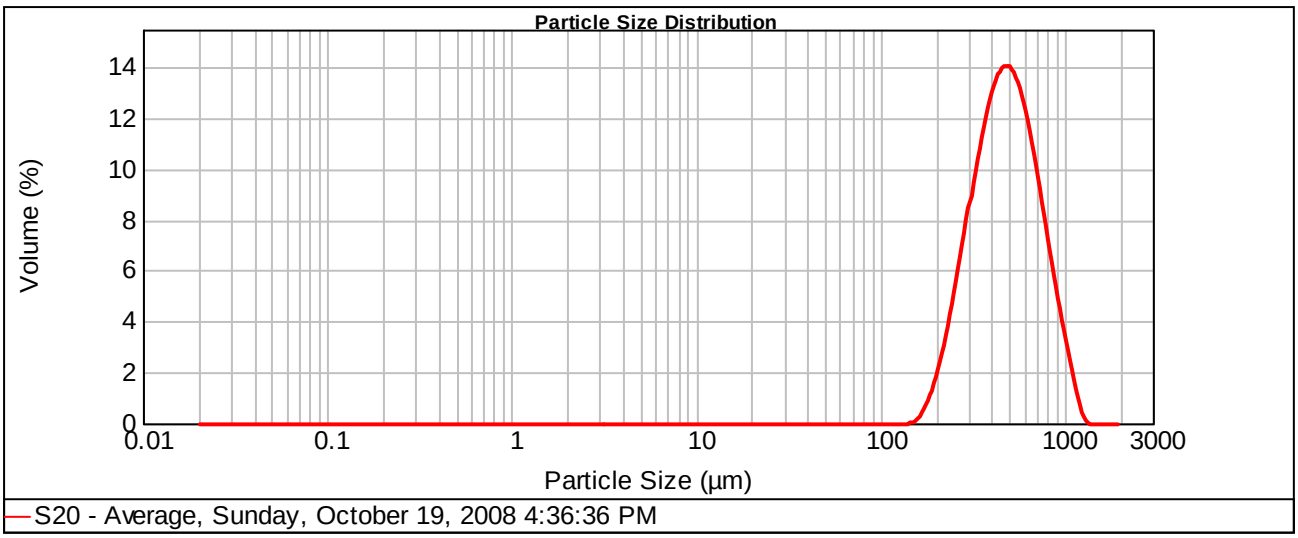
Surface Weighted Mean D[3,2]:
437.679 um

Vol. Weighted Mean D[4,3]:
513.850 um

---

d(0.1): 278.523 um **d(0.5):** 476.070 um **d(0.9):** 807.078 um

---



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	0.01
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.02	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	0.40	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	1.34	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	2.84	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	4.91	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	7.27	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	9.63	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	11.51	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	12.57	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	12.56	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	11.49	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	9.59	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	7.23	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	4.87	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	2.80	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	0.95		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925			

Operator notes: *We did not sample from top down in this one:*
S18= 10-12cm
S19= 7-9

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S21 - Average

SOP Name:

Measured:
Sunday, October 19, 2008 4:50:46 PM

Sample Source & type:
Thiruvadandhai

Measured by:
student

Analysed:
Sunday, October 19, 2008 4:50:48 PM

Sample bulk lot ref:
Pit2

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
20.77 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.587 %

Result Emulation:
Off

Concentration:
0.3221 %Vol

Span :
1.922

Uniformity:
0.571

Result units:
Volume

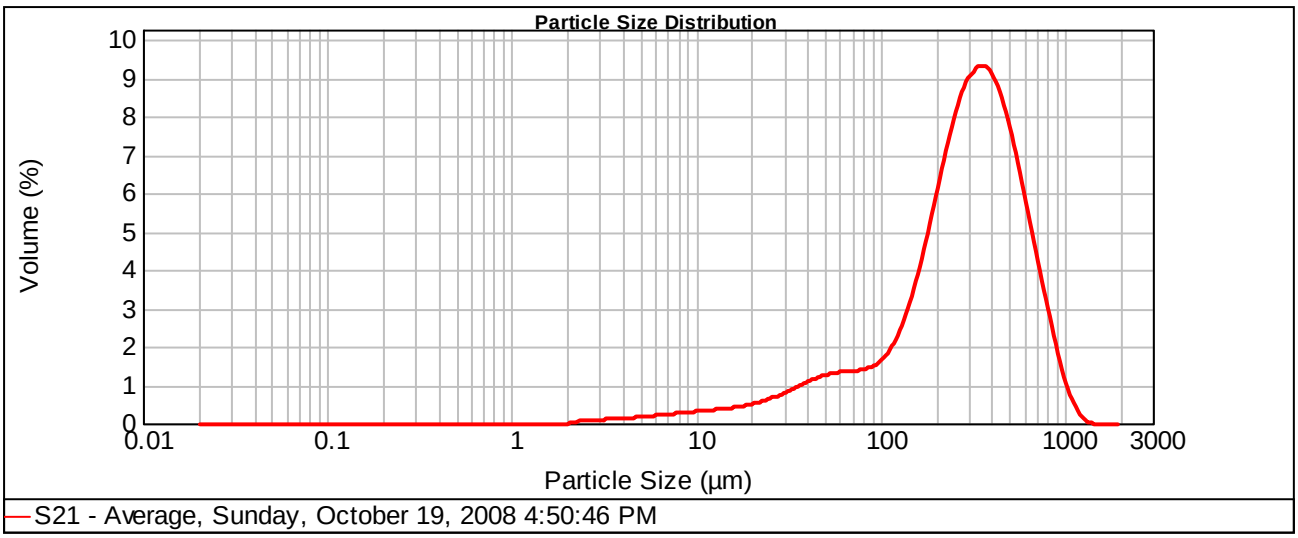
Specific Surface Area:
0.0591 m²/g

Surface Weighted Mean D[3,2]:
101.558 um

Vol. Weighted Mean D[4,3]:
334.142 um

---

d(0.1): 58.831 um **d(0.5):** 301.324 um **d(0.9):** 638.111 um



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.32	120.226	2.22	1258.925	0.02
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.35	138.038	2.97	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.38	158.489	3.93	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.42	181.970	5.07	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.48	208.930	6.23	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.06	22.909	0.57	239.883	7.29	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.08	26.303	0.67	275.423	8.05	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.09	30.200	0.79	316.228	8.41	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.10	34.674	0.91	363.078	8.29	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.12	39.811	1.03	416.869	7.71	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.14	45.709	1.13	478.630	6.76	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.16	52.481	1.19	549.541	5.56	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.19	60.256	1.22	630.957	4.28	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.22	69.183	1.25	724.436	3.04	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.24	79.433	1.30	831.764	1.87	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.27	91.201	1.43	954.993	0.87	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.29	104.713	1.72	1096.478	0.32		
0.105	0.00	1.096	0.00	11.482	0.29	120.226	1.72	1258.925	0.32		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S22 - Average

SOP Name:

Measured:
Sunday, October 19, 2008 4:59:54 PM

Sample Source & type:
Thiruvadandhai

Measured by:
student

Analysed:
Sunday, October 19, 2008 4:59:55 PM

Sample bulk lot ref:
Pit2

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
21.06 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.896 %

Result Emulation:
Off

Concentration:
0.9925 %Vol

Span :
1.137

Uniformity:
0.354

Result units:
Volume

Specific Surface Area:
0.0202 m²/g

Surface Weighted Mean D[3,2]:
296.326 um

Vol. Weighted Mean D[4,3]:
383.921 um

d(0.1): 203.978 um **d(0.5):** 357.512 um **d(0.9):** 610.595 um

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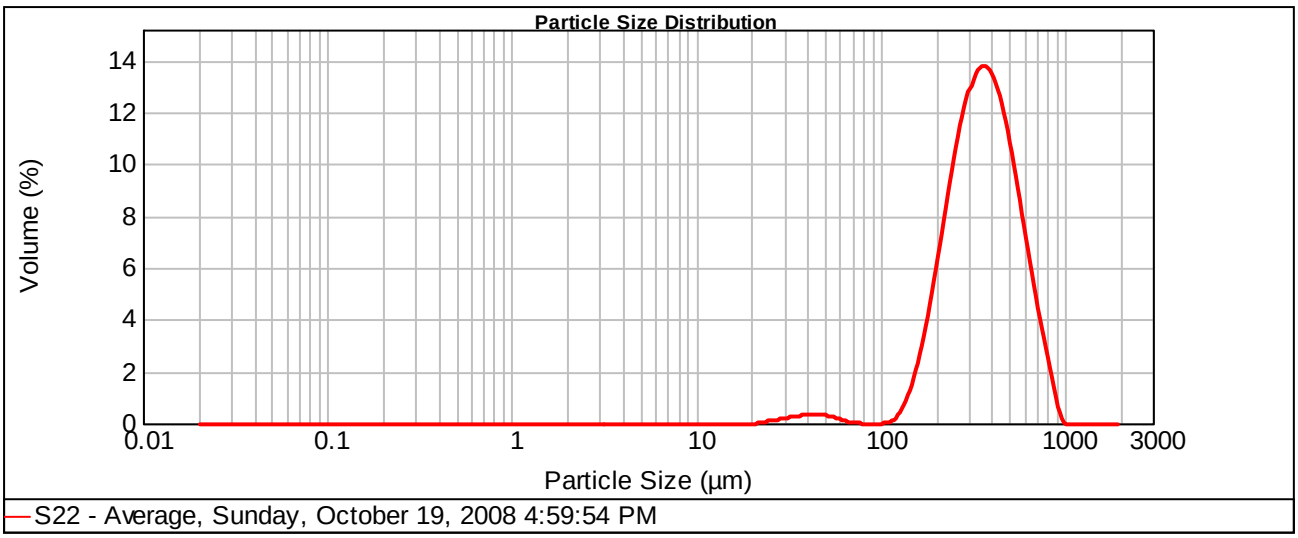

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.40	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	1.32	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	2.79	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	4.84	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	7.17	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.08	239.883	9.51	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.15	275.423	11.35	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.22	316.228	12.37	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.28	363.078	12.33	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.31	416.869	11.25	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.29	478.630	9.39	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.21	549.541	7.10	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.07	630.957	4.81	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	2.81	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	0.91	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	0.00	10000.000	
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.03	1096.478	0.00		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S23 - Average

SOP Name:

Measured:
Sunday, October 19, 2008 5:08:11 PM

Sample Source & type:
Thiruvadandhai

Measured by:
student

Analysed:
Sunday, October 19, 2008 5:08:13 PM

Sample bulk lot ref:
Pit2

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
19.94 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.890 %

Result Emulation:
Off

Concentration:
0.9492 %Vol

Span :
1.275

Uniformity:
0.394

Result units:
Volume

Specific Surface Area:
0.0199 m²/g

Surface Weighted Mean D[3,2]:
301.179 um

Vol. Weighted Mean D[4,3]:
395.080 um

d(0.1): 194.299 um **d(0.5):** 360.955 um **d(0.9):** 654.384 um

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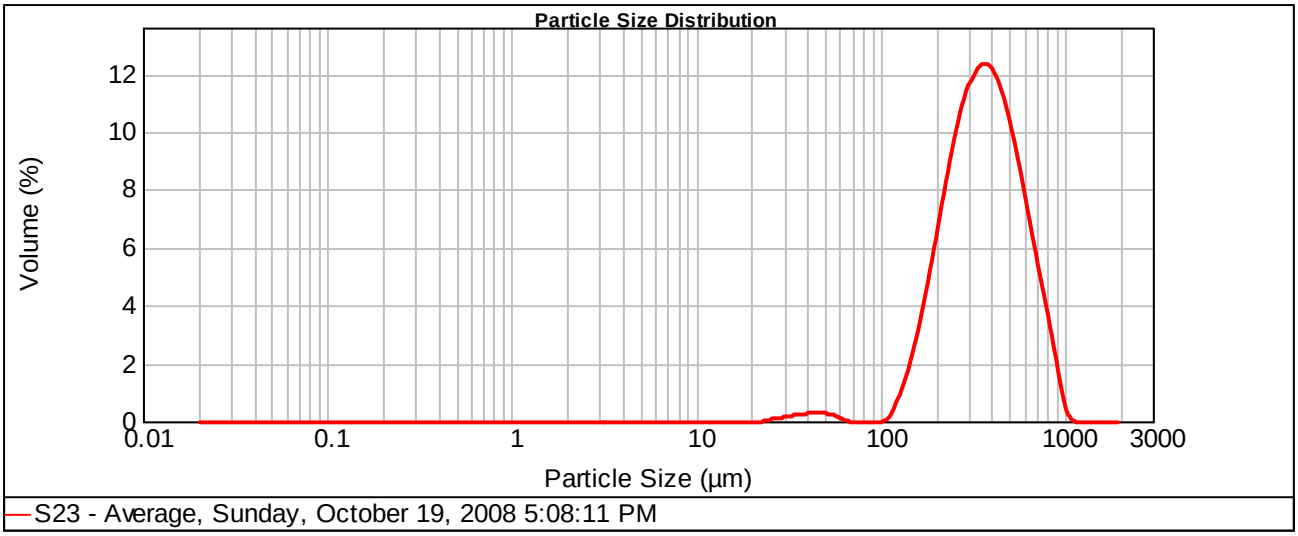

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.89	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	1.97	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	3.46	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	5.27	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	7.16	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.03	239.883	8.95	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.10	275.423	10.31	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.17	316.228	11.06	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.23	363.078	11.08	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.26	416.869	10.37	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.25	478.630	9.07	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.19	549.541	7.37	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.02	630.957	5.54	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	3.79	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	1.99	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	0.32	10000.000	
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.16	1096.478	0.00		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S24 - Average

SOP Name:

Measured:
Sunday, October 19, 2008 5:19:04 PM

Sample Source & type:
Thiruvadandhai

Measured by:
student

Analysed:
Sunday, October 19, 2008 5:19:06 PM

Sample bulk lot ref:
Pit2

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
18.72 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.129 %

Result Emulation:
Off

Concentration:
1.0240 %Vol

Span :
1.335

Uniformity:
0.415

Result units:
Volume

Specific Surface Area:
0.0172 m²/g

Surface Weighted Mean D[3,2]:
348.856 um

Vol. Weighted Mean D[4,3]:
480.661 um

d(0.1): 226.384 um **d(0.5):** 437.316 um **d(0.9):** 810.229 um

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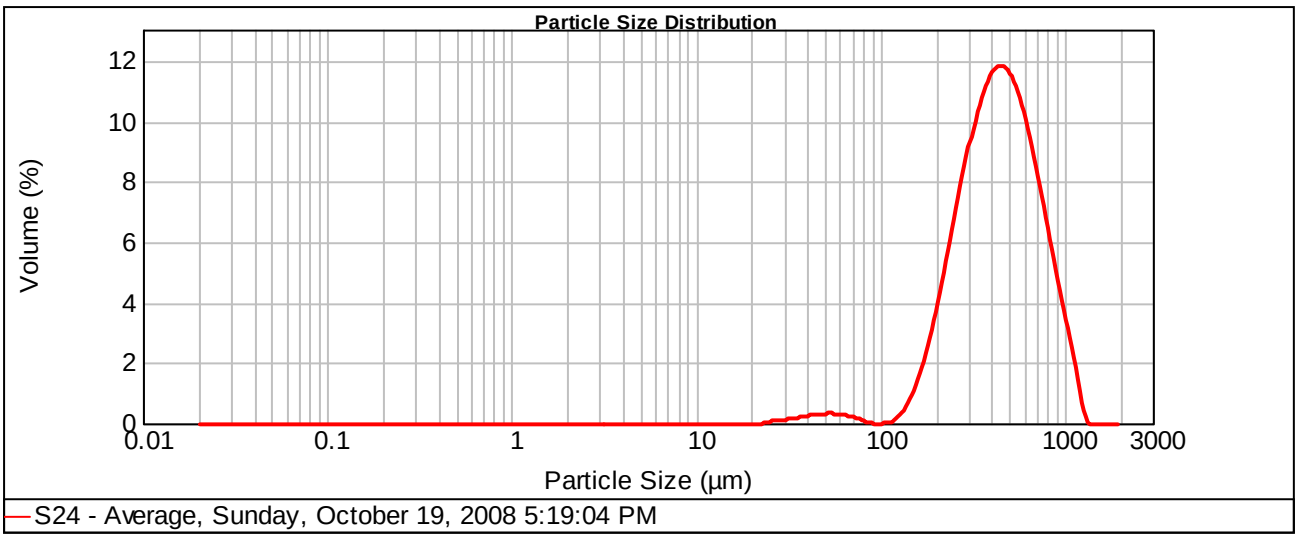


Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.26	1258.925	0.02
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.81	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	1.72	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	3.01	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	4.58	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.03	239.883	6.33	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.09	275.423	8.02	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.14	316.228	9.44	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.19	363.078	10.38	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.25	416.869	10.70	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.29	478.630	10.36	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.29	549.541	9.40	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.25	630.957	7.99	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.16	724.436	6.32	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.03	831.764	4.59	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	2.98	10000.000	
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.03	1096.478	1.35		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S25 - Average

SOP Name:

Measured:
Sunday, October 19, 2008 5:32:12 PM

Sample Source & type:
Thiruvadandhai

Measured by:
student

Analysed:
Sunday, October 19, 2008 5:32:13 PM

Sample bulk lot ref:
Pit2

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
20.59 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.165 %

Result Emulation:
Off

Concentration:
1.1317 %Vol

Span :
1.427

Uniformity:
0.444

Result units:
Volume

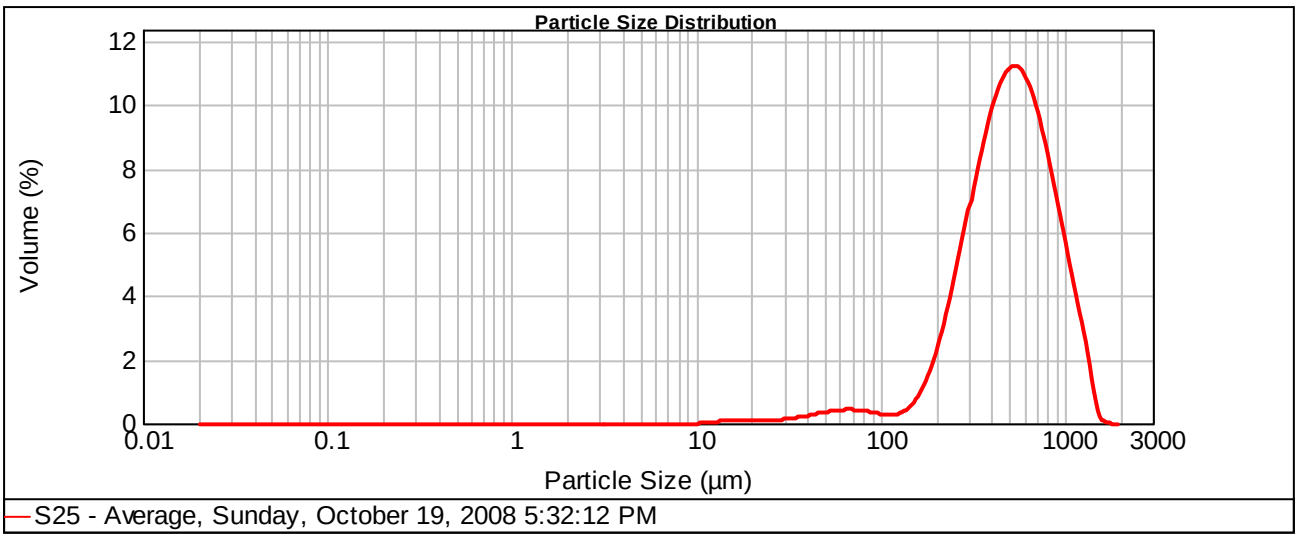
Specific Surface Area:
0.0173 m²/g

Surface Weighted Mean D[3,2]:
347.246 um

Vol. Weighted Mean D[4,3]:
557.500 um

d(0.1): 241.253 um **d(0.5):** 507.273 um **d(0.9):** 965.029 um

---



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.04	120.226	0.30	1258.925	1.89
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.06	138.038	0.52	1445.440	0.21
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.07	158.489	0.99	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.07	181.970	1.78	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.07	208.930	2.88	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.08	239.883	4.27	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.10	275.423	5.82	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.14	316.228	7.38	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.19	363.078	8.73	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.25	416.869	9.70	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.31	478.630	10.13	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.37	549.541	9.95	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.39	630.957	9.21	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.38	724.436	8.00	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.34	831.764	6.52	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.28	954.993	4.95	10000.000	
0.091	0.00	0.955	0.00	10.000	0.01	104.713	0.24	1096.478	3.39		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S26 - Average

SOP Name:

Measured:
Tuesday, October 21, 2008 10:03:29 AM

Sample Source & type:
Thiruvadandhai

Measured by:
student

Analysed:
Tuesday, October 21, 2008 10:03:30 AM

Sample bulk lot ref:
Pit2

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
21.79 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.961 %

Result Emulation:
Off

Concentration:
1.2015 %Vol

Span :
1.317

Uniformity:
0.41

Result units:
Volume

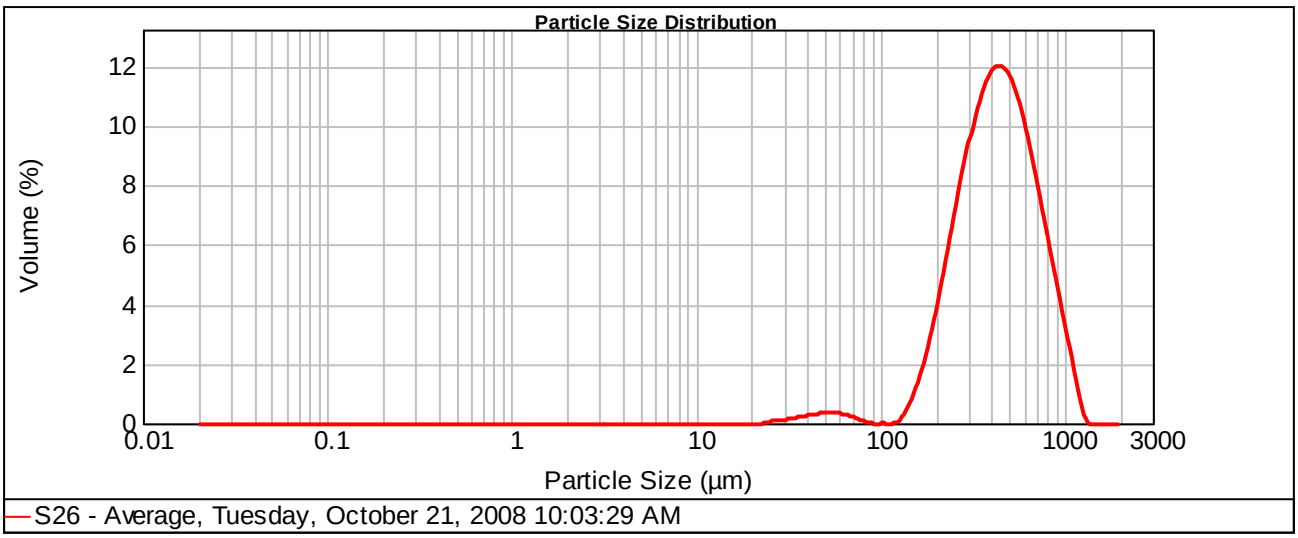
Specific Surface Area:
0.0174 m²/g

Surface Weighted Mean D[3,2]:
345.189 um

Vol. Weighted Mean D[4,3]:
473.988 um

d(0.1): 226.877 um **d(0.5):** 431.556 um **d(0.9):** 795.337 um

---



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.12	1258.925	0.02
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.75	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	1.68	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	3.04	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	4.70	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.03	239.883	6.53	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.09	275.423	8.28	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.15	316.228	9.72	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.21	363.078	10.63	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.27	416.869	10.86	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.31	478.630	10.40	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.32	549.541	9.33	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.26	630.957	7.82	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.16	724.436	6.10	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.02	831.764	4.39	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	2.74	10000.000	
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	1.07		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S27 - Average

SOP Name:

Measured:
Tuesday, October 21, 2008 10:12:12 AM

Sample Source & type:
Thiruvadandhai

Measured by:
student

Analysed:
Tuesday, October 21, 2008 10:12:13 AM

Sample bulk lot ref:
Pit2

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
22.72 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.969 %

Result Emulation:
Off

Concentration:
1.3233 %Vol

Span :
1.131

Uniformity:
0.354

Result units:
Volume

Specific Surface Area:
0.0166 m²/g

Surface Weighted Mean D[3,2]:
362.425 um

Vol. Weighted Mean D[4,3]:
462.968 um

d(0.1): 246.733 um **d(0.5):** 431.418 um **d(0.9):** 734.527 um

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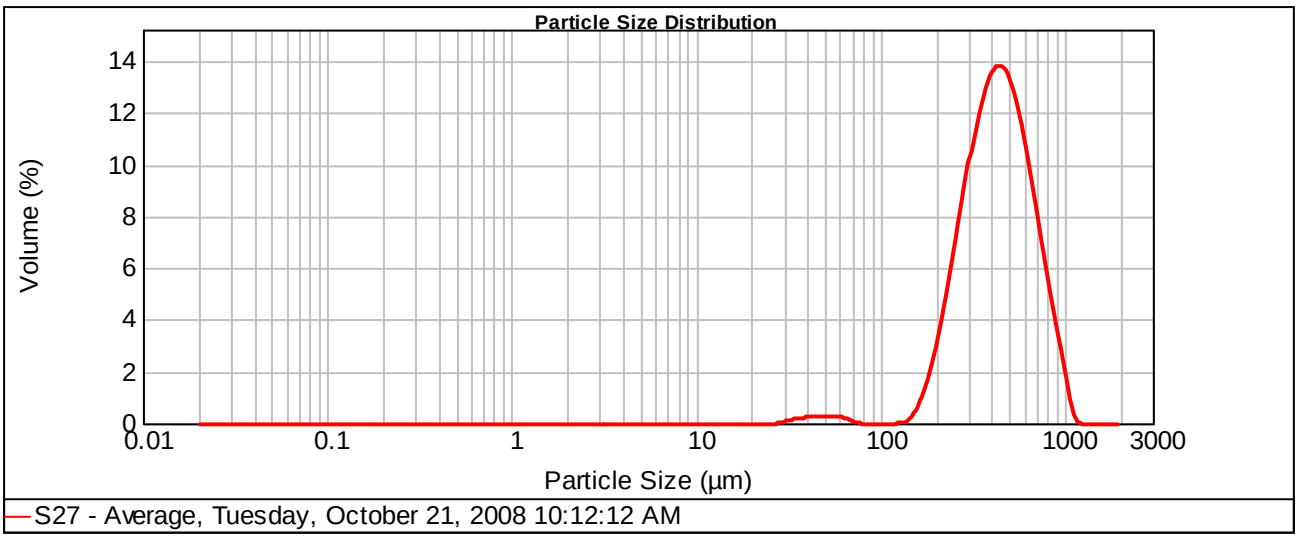

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.23	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	0.97	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	2.28	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	4.12	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	6.39	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.03	275.423	8.73	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.13	316.228	10.78	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.19	363.078	12.11	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.24	416.869	12.47	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.27	478.630	11.78	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.24	549.541	10.18	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.18	630.957	8.01	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.02	724.436	5.65	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	3.50	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	1.48	10000.000	
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	0.04		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S28 - Average

SOP Name:

Measured:
Tuesday, October 21, 2008 10:21:12 AM

Sample Source & type:
Thiruvadandhai

Measured by:
student

Analysed:
Tuesday, October 21, 2008 10:21:14 AM

Sample bulk lot ref:
Pit2

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
21.15 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.895 %

Result Emulation:
Off

Concentration:
1.1280 %Vol

Span :
1.054

Uniformity:
0.325

Result units:
Volume

Specific Surface Area:
0.0179 m²/g

Surface Weighted Mean D[3,2]:
334.412 um

Vol. Weighted Mean D[4,3]:
386.968 um

d(0.1): 216.236 um **d(0.5):** 361.352 um **d(0.9):** 597.176 um

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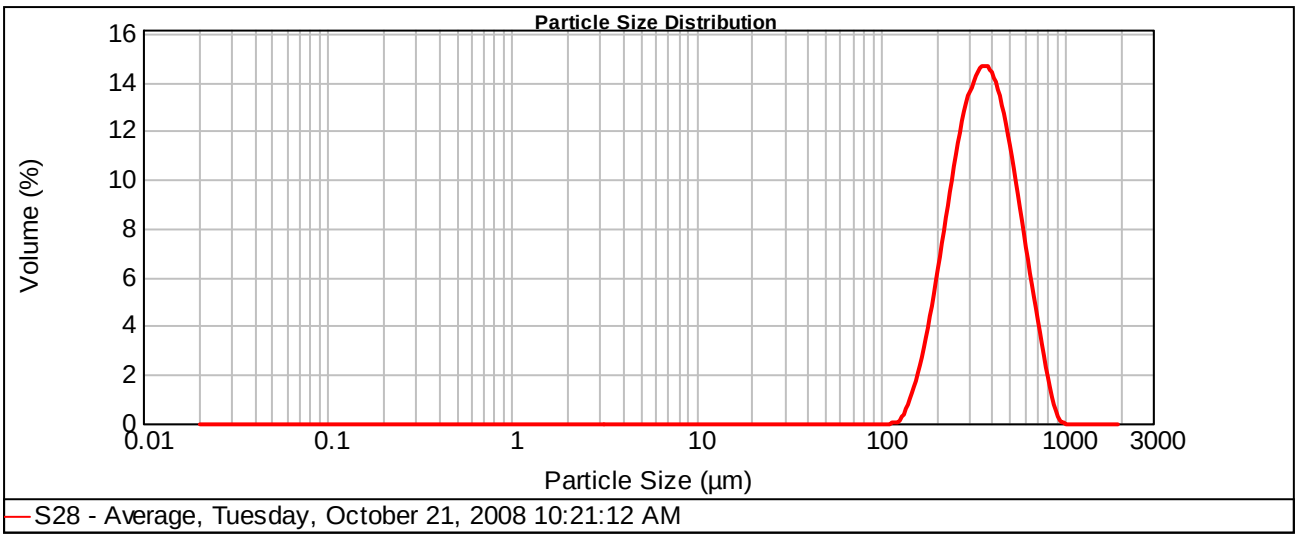

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.15	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	1.08	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	2.54	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	4.69	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	7.21	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	9.80	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	11.90	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	13.10	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	13.11	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	11.92	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	9.83	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	7.24	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	4.68	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	2.32	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	0.44	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	0.00	10000.000	
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	0.00		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S29 - Average

SOP Name:

Measured:
Tuesday, October 21, 2008 10:33:11 AM

Sample Source & type:
Thiruvadandhai

Measured by:
student

Analysed:
Tuesday, October 21, 2008 10:33:13 AM

Sample bulk lot ref:
Pit2

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
22.63 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.921 %

Result Emulation:
Off

Concentration:
1.2566 %Vol

Span :
1.057

Uniformity:
0.328

Result units:
Volume

Specific Surface Area:
0.0174 m²/g

Surface Weighted Mean D[3,2]:
345.021 um

Vol. Weighted Mean D[4,3]:
399.513 um

d(0.1): 222.986 um **d(0.5):** 372.899 um **d(0.9):** 617.211 um

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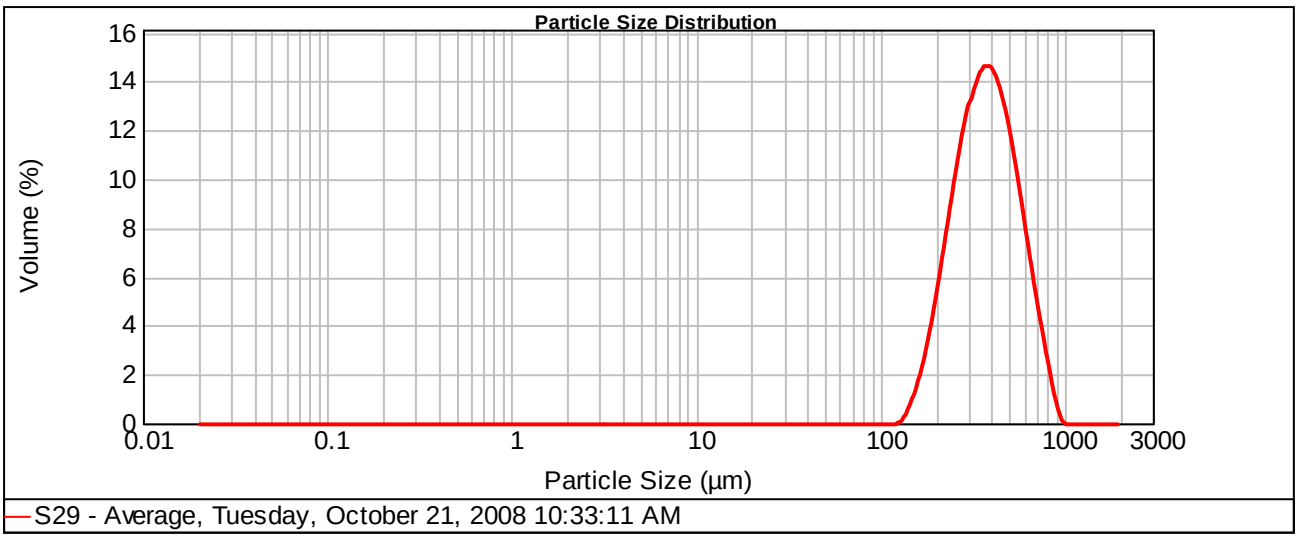


Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.07	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.84	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	2.14	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	4.16	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	6.61	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	9.23	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	11.47	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	12.91	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	13.20	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	12.27	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	10.35	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	7.82	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	5.23	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	2.89	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	0.81	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	0.00	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	0.00		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	0.00		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S30 - Average

SOP Name:

Measured:
Wednesday, October 08, 2008 5:07:38 PM

Sample Source & type:
Thiruvadandhai

Measured by:
student

Analysed:
Wednesday, October 08, 2008 5:07:39 PM

Sample bulk lot ref:
Pit 3 150m

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
17.57 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
2.261 %

Result Emulation:
Off

Concentration:
1.1746 %Vol

Span :
1.202

Uniformity:
0.367

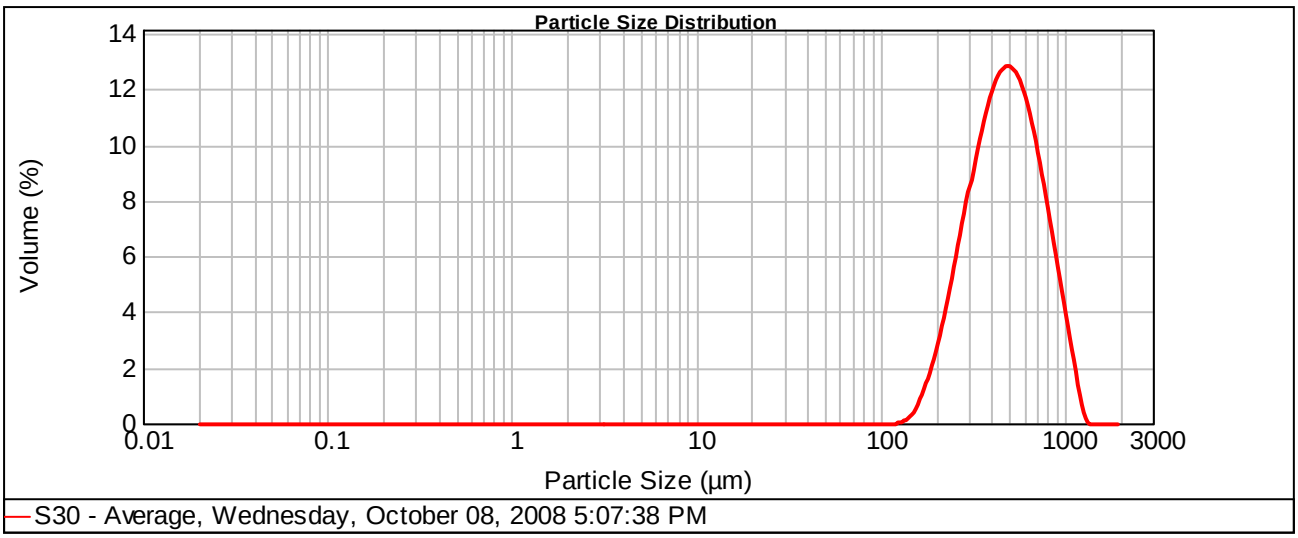
Result units:
Volume

Specific Surface Area:
0.014 m²/g

Surface Weighted Mean D[3,2]:
427.928 um

Vol. Weighted Mean D[4,3]:
516.505 um

d(0.1): 262.365 um **d(0.5):** 476.250 um **d(0.9):** 834.751 um



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.04	1258.925	0.02
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.24	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	0.98	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	2.03	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	3.49	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	5.30	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	7.23	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	9.09	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	10.57	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	11.45	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	11.56	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	10.85	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	9.45	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	7.56	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	5.45	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	3.39	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	1.31		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	0.00		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S31 - Average

SOP Name:

Measured:
Wednesday, October 08, 2008 5:20:34 PM

Sample Source & type:
Thiruvadandhai

Measured by:
student

Analysed:
Wednesday, October 08, 2008 5:20:36 PM

Sample bulk lot ref:
Pit 3 150m

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
15.86 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
2.524 %

Result Emulation:
Off

Concentration:
1.1168 %Vol

Span :
1.186

Uniformity:
0.366

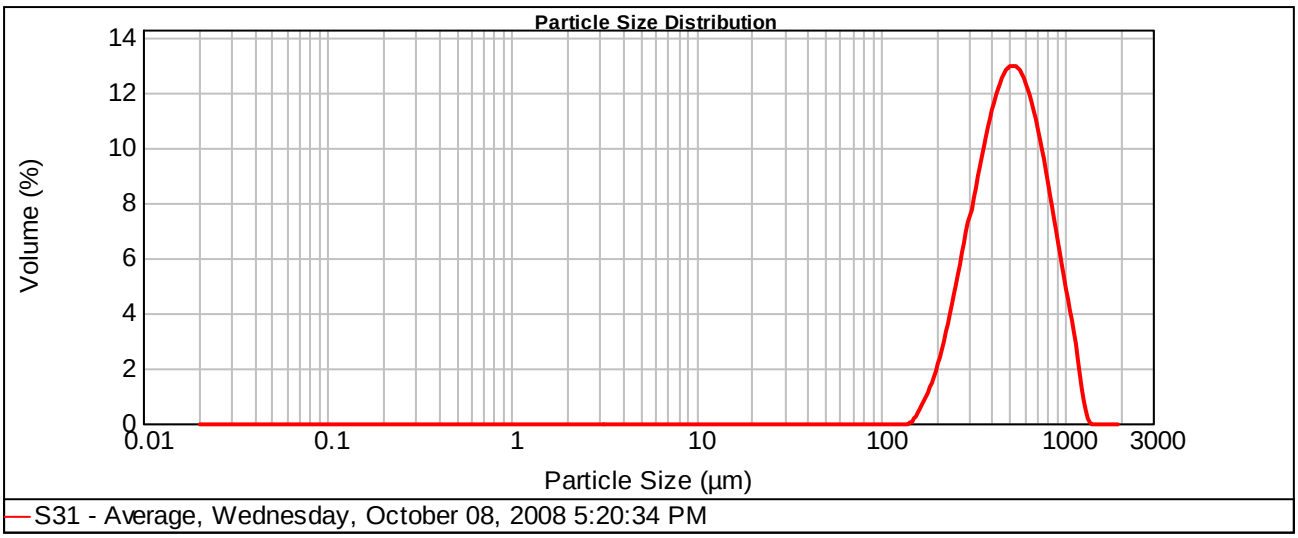
Result units:
Volume

Specific Surface Area:
0.0132 m²/g

Surface Weighted Mean D[3,2]:
455.373 um

Vol. Weighted Mean D[4,3]:
547.197 um

d(0.1): 280.157 um **d(0.5):** 506.291 um **d(0.9):** 880.569 um



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	0.08
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.04	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	0.63	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	1.47	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	2.75	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	4.43	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	6.34	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	8.30	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	10.02	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	11.25	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	11.74	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	11.39	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	10.25	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	8.49	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	6.37	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	4.28	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	2.16		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S32 - Average

SOP Name:

Measured:
Tuesday, October 14, 2008 1:35:46 PM

Sample Source & type:
Thiruvadandhai

Measured by:
Unknown

Analysed:
Tuesday, October 14, 2008 1:35:48 PM

Sample bulk lot ref:
Pit 3 150m

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
16.02 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.800 %

Result Emulation:
Off

Concentration:
1.2366 %Vol

Span :
1.132

Uniformity:
0.348

Result units:
Volume

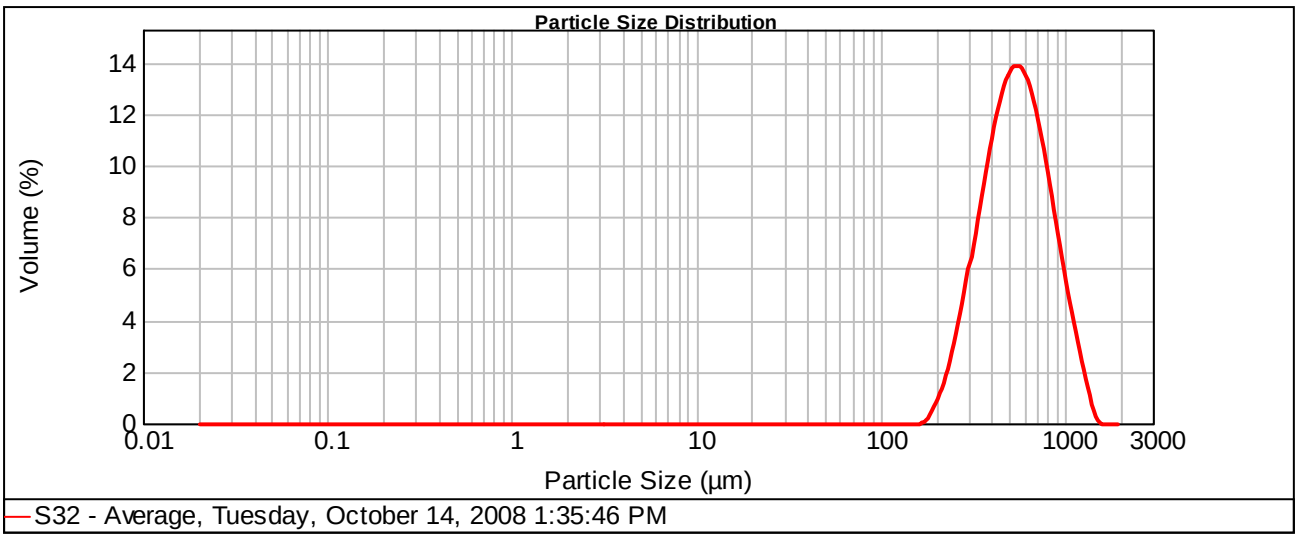
Specific Surface Area:
0.012 m²/g

Surface Weighted Mean D[3,2]:
498.813 um

Vol. Weighted Mean D[4,3]:
588.803 um

---

d(0.1): 315.677 um **d(0.5):** 543.572 um **d(0.9):** 930.869 um



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	1.15
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.00	1445.440	0.03
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	0.02	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	0.53	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	1.48	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	3.02	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	5.04	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	7.38	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	9.65	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	11.46	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	12.44	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	12.37	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	11.28	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	9.39	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	7.09	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	4.81	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	2.87		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S33 - Average

SOP Name:

Measured:
Tuesday, October 14, 2008 1:48:48 PM

Sample Source & type:
Thiruvadandhai

Measured by:
Unknown

Analysed:
Tuesday, October 14, 2008 1:48:49 PM

Sample bulk lot ref:
Pit 3 150m

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
17.06 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.798 %

Result Emulation:
Off

Concentration:
1.2901 %Vol

Span :
1.139

Uniformity:
0.352

Result units:
Volume

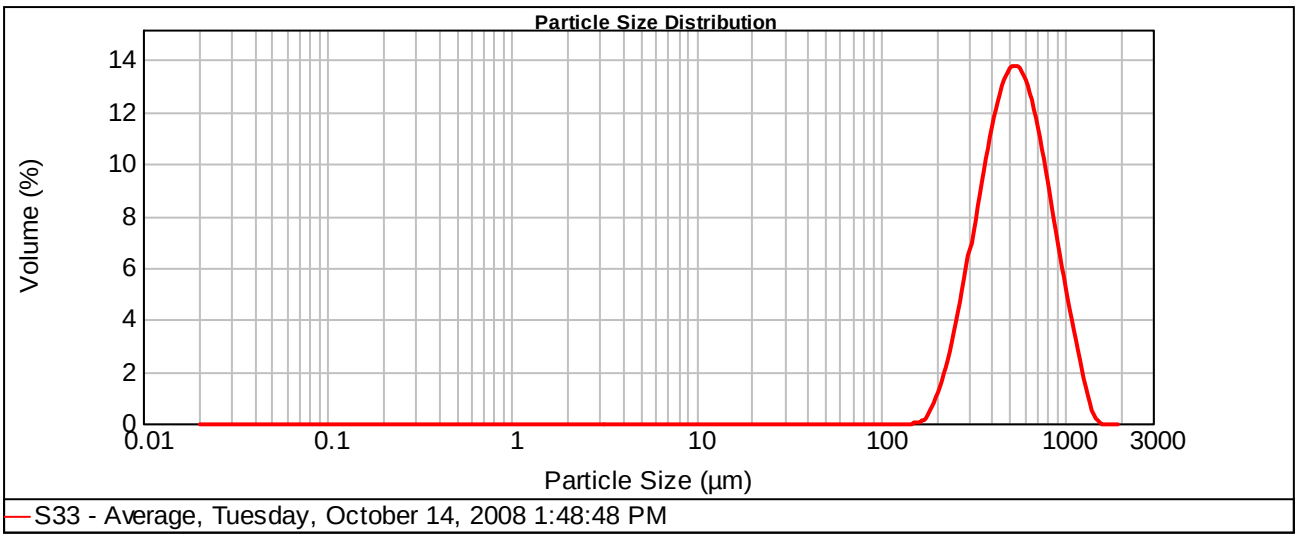
Specific Surface Area:
0.0123 m²/g

Surface Weighted Mean D[3,2]:
485.891 um

Vol. Weighted Mean D[4,3]:
574.630 um

---

d(0.1): 306.713 um **d(0.5):** 530.213 um **d(0.9):** 910.732 um



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	0.85
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.00	1445.440	0.02
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	0.08	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	0.69	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	1.75	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	3.40	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	5.48	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	7.81	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	9.98	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	11.63	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	12.42	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	12.17	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	10.95	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	8.99	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	6.69	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	4.52	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	2.57		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	0.85		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S34 - Average

SOP Name:

Measured:
Tuesday, October 14, 2008 2:00:10 PM

Sample Source & type:
Thiruvadandhai

Measured by:
Unknown

Analysed:
Tuesday, October 14, 2008 2:00:11 PM

Sample bulk lot ref:
Pit 3 150m

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
17.16 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.816 %

Result Emulation:
Off

Concentration:
1.2511 %Vol

Span :
1.267

Uniformity:
0.391

Result units:
Volume

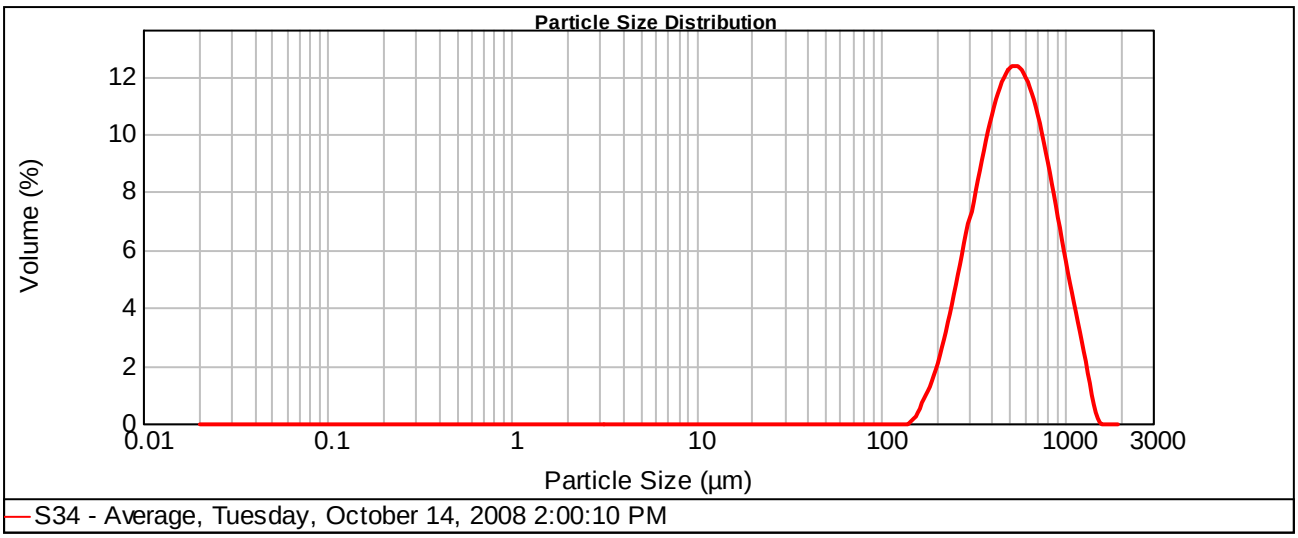
Specific Surface Area:
0.0128 m²/g

Surface Weighted Mean D[3,2]:
468.033 um

Vol. Weighted Mean D[4,3]:
574.111 um

---

d(0.1): 282.677 um **d(0.5):** 523.375 um **d(0.9):** 945.556 um



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	1.46
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.05	1445.440	0.05
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	0.65	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	1.45	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	2.66	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	4.21	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	5.98	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	7.80	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	9.41	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	10.60	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	11.15	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	10.97	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	10.08	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	8.62	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	6.80	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	4.90	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	3.17		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S35 - Average

SOP Name:

Measured:
Tuesday, October 14, 2008 2:13:09 PM

Sample Source & type:
Thiruvadandhai

Measured by:
Unknown

Analysed:
Tuesday, October 14, 2008 2:13:11 PM

Sample bulk lot ref:
Pit 3 150m

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
23.03 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.329 %

Result Emulation:
Off

Concentration:
1.4151 %Vol

Span :
1.297

Uniformity:
0.4

Result units:
Volume

Specific Surface Area:
0.0158 m²/g

Surface Weighted Mean D[3,2]:
380.468 um

Vol. Weighted Mean D[4,3]:
471.353 um

d(0.1): 227.200 um **d(0.5):** 428.692 um **d(0.9):** 783.268 um

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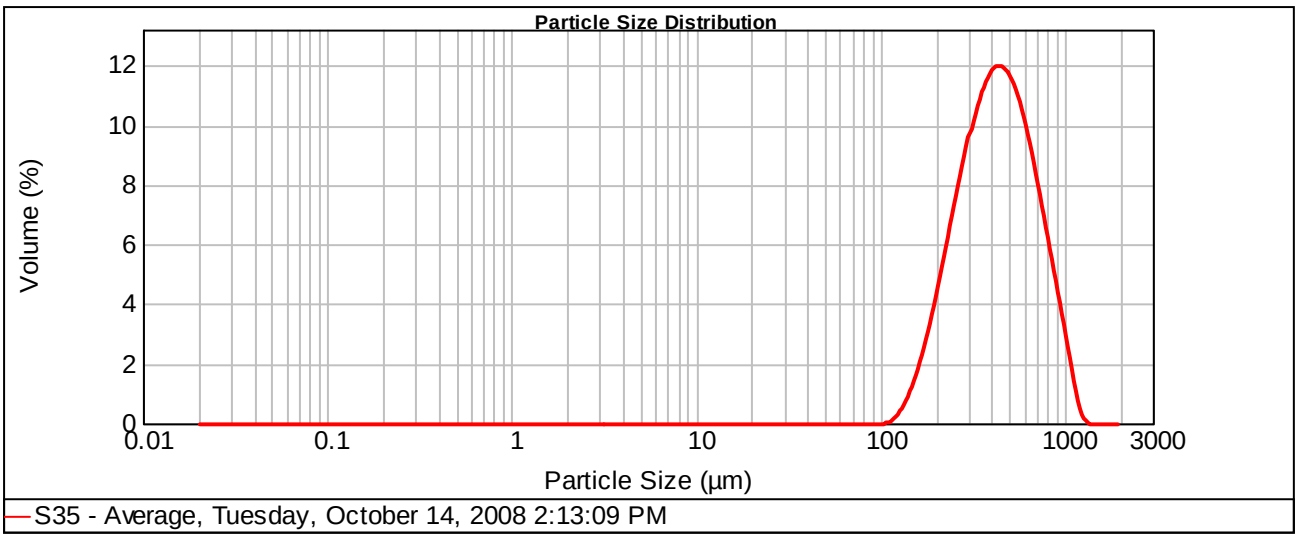

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.38	1258.925	0.01
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	1.09	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	2.12	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	3.49	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	5.09	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	6.81	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	8.42	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	9.76	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	10.61	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	10.84	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	10.41	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	9.38	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	7.88	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	6.12	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	4.31	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	2.52	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.03	1096.478	0.72		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.03	1258.925	0.72		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S36 - Average

SOP Name:

Measured:
Tuesday, October 14, 2008 3:18:54 PM

Sample Source & type:
Thiruvadandhai

Measured by:
Unknown

Analysed:
Tuesday, October 14, 2008 3:18:55 PM

Sample bulk lot ref:
Pit 3 150m

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
19.31 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.394 %

Result Emulation:
Off

Concentration:
1.1579 %Vol

Span :
1.255

Uniformity:
0.386

Result units:
Volume

Specific Surface Area:
0.0158 m²/g

Surface Weighted Mean D[3,2]:
380.001 um

Vol. Weighted Mean D[4,3]:
464.507 um

d(0.1): 229.910 um **d(0.5):** 424.861 um **d(0.9):** 762.957 um

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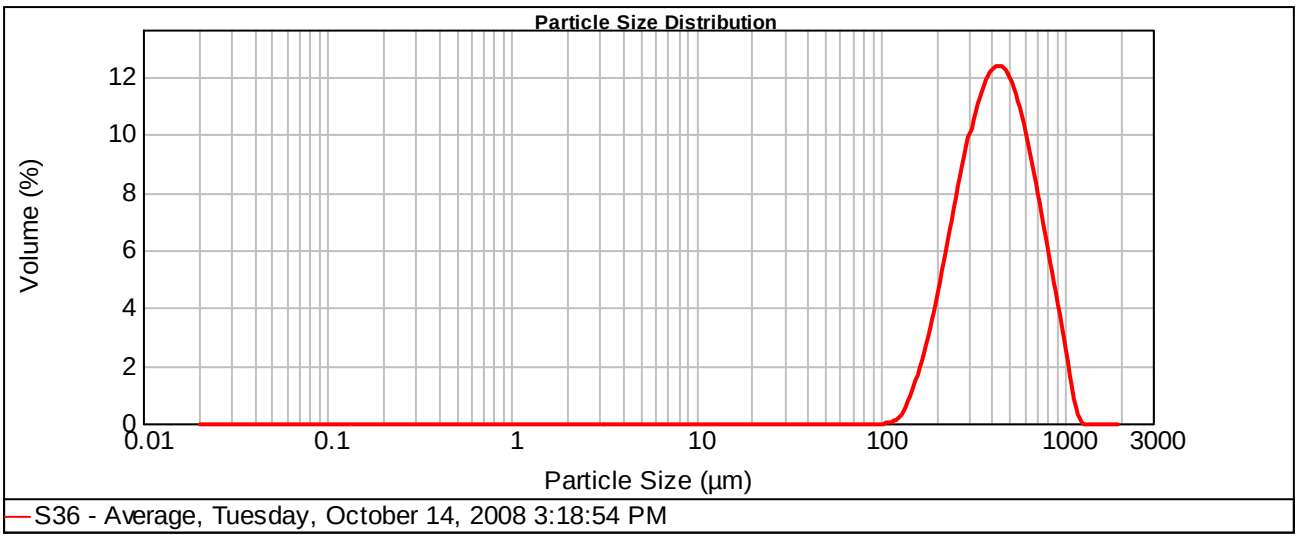


Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.22	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.98	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	1.99	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	3.43	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	5.11	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	6.95	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	8.68	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	10.10	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	10.96	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	11.15	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	10.63	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	9.46	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	7.83	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	5.96	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	4.08	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	2.16	10000.000	
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.03	1096.478	0.27		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S37 - Average

SOP Name:

Measured:
Sunday, October 19, 2008 4:02:40 PM

Sample Source & type:
Thiruvadandhai

Measured by:
student

Analysed:
Sunday, October 19, 2008 4:02:42 PM

Sample bulk lot ref:
Pit 1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
18.42 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.959 %

Result Emulation:
Off

Concentration:
1.3857 %Vol

Span :
1.160

Uniformity:
0.359

Result units:
Volume

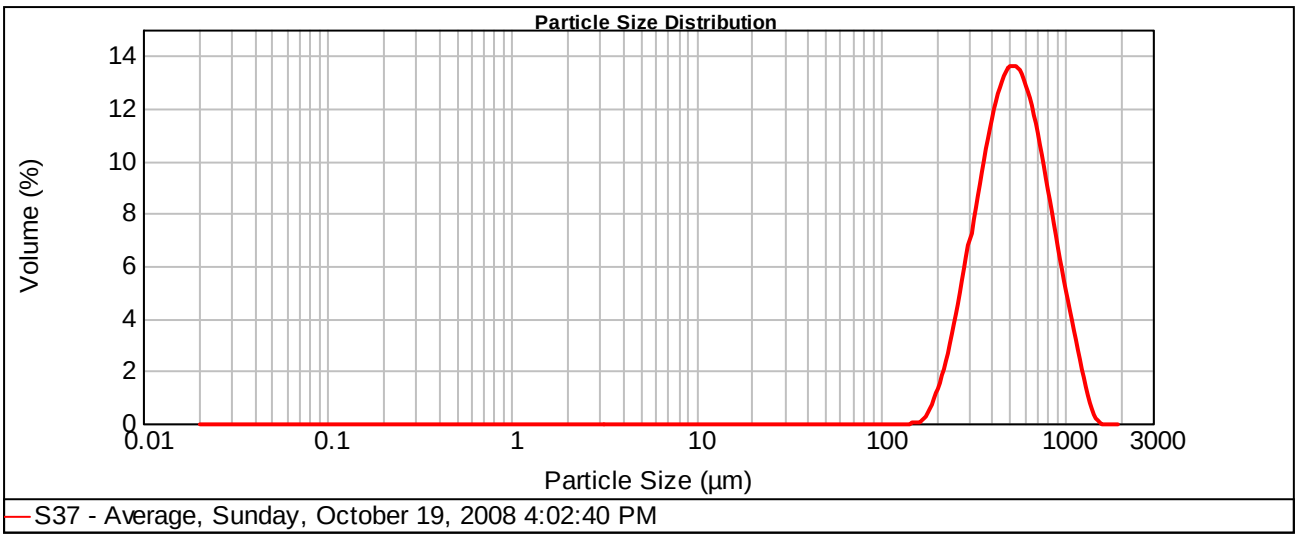
Specific Surface Area:
0.0125 m²/g

Surface Weighted Mean D[3,2]:
479.227 um

Vol. Weighted Mean D[4,3]:
568.951 um

d(0.1): 301.664 um **d(0.5):** 522.592 um **d(0.9):** 907.944 um

---



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	0.90
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.00	1445.440	0.02
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	0.11	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	0.79	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	1.92	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	3.64	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	5.77	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	8.08	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	10.18	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	11.69	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	12.30	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	11.91	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	10.60	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	8.66	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	6.46	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	4.42	10000.000	
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	2.55		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S38 - Average

SOP Name:

Measured:
Tuesday, October 14, 2008 3:31:51 PM

Sample Source & type:
Thiruvadandhai

Measured by:
Unknown

Analysed:
Tuesday, October 14, 2008 3:31:53 PM

Sample bulk lot ref:
Pit 3 150m

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
22.17 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.493 %

Result Emulation:
Off

Concentration:
1.4315 %Vol

Span :
1.272

Uniformity:
0.392

Result units:
Volume

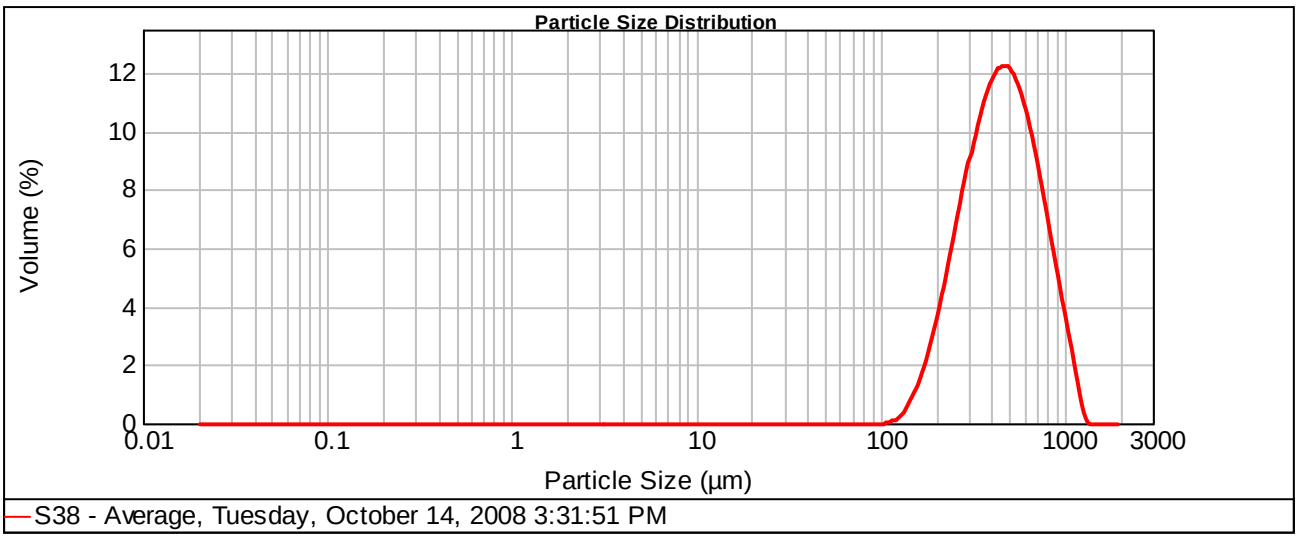
Specific Surface Area:
0.0149 m²/g

Surface Weighted Mean D[3,2]:
402.126 um

Vol. Weighted Mean D[4,3]:
495.658 um

d(0.1): 241.685 um **d(0.5):** 452.813 um **d(0.9):** 817.859 um

---



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.21	1258.925	0.02
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.78	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	1.59	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	2.80	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	4.31	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	6.05	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	7.79	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	9.36	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	10.50	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	11.03	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	10.87	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	10.01	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	8.59	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	6.81	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	4.91	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	3.09	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.04	1096.478	1.25		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.04	1258.925	1.25		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S39 - Average

SOP Name:

Measured:
Tuesday, October 14, 2008 3:42:56 PM

Sample Source & type:
Thiruvadandhai

Measured by:
Unknown

Analysed:
Tuesday, October 14, 2008 3:42:58 PM

Sample bulk lot ref:
Pit 3 150m

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
22.84 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
2.143 %

Result Emulation:
Off

Concentration:
2.0208 %Vol

Span :
1.167

Uniformity:
0.361

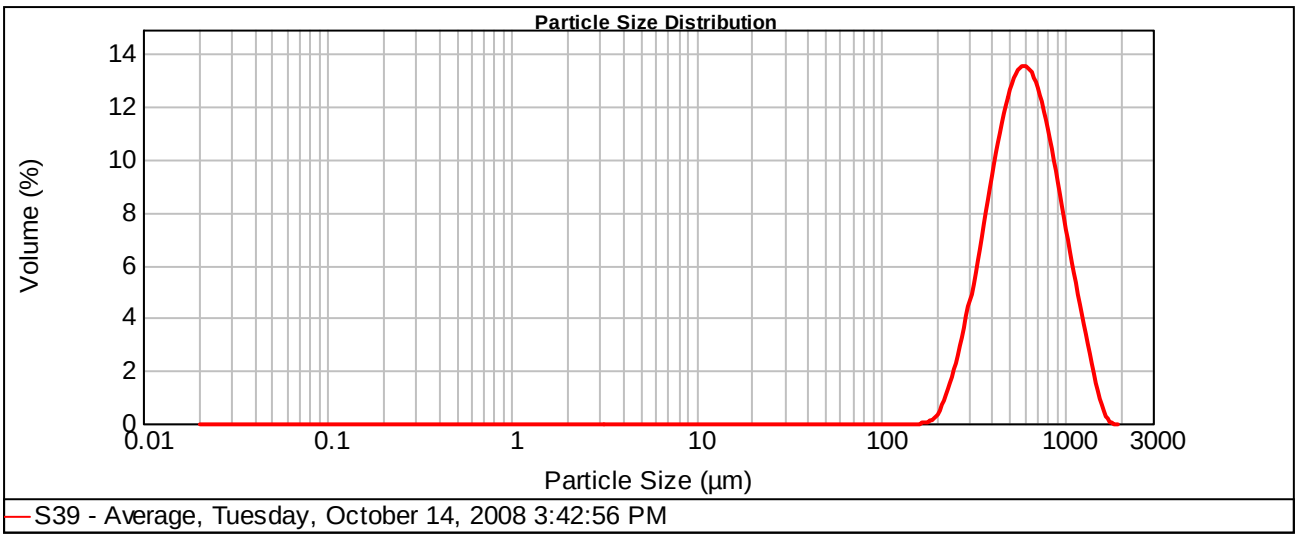
Result units:
Volume

Specific Surface Area:
0.0109 m²/g

Surface Weighted Mean D[3,2]:
548.752 um

Vol. Weighted Mean D[4,3]:
652.727 um

d(0.1): 344.578 um **d(0.5):** 599.292 um **d(0.9):** 1043.755 um



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	2.58
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.00	1445.440	0.87
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	0.01	1659.587	0.04
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	0.14	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	0.82	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	1.99	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	3.69	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	5.82	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	8.09	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	10.16	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	11.63	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	12.23	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	11.84	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	10.55	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	8.64	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	6.47	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	4.45		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S40 - Average

SOP Name:

Measured:
Tuesday, October 14, 2008 3:52:57 PM

Sample Source & type:
Thiruvadandhai

Measured by:
Unknown

Analysed:
Tuesday, October 14, 2008 3:52:58 PM

Sample bulk lot ref:
Pit 3 150m

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
22.94 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
2.083 %

Result Emulation:
Off

Concentration:
1.9696 %Vol

Span :
1.332

Uniformity:
0.41

Result units:
Volume

Specific Surface Area:
0.0113 m²/g

Surface Weighted Mean D[3,2]:
532.366 um

Vol. Weighted Mean D[4,3]:
664.345 um

d(0.1): 316.644 um **d(0.5):** 599.997 um **d(0.9):** 1115.878 um

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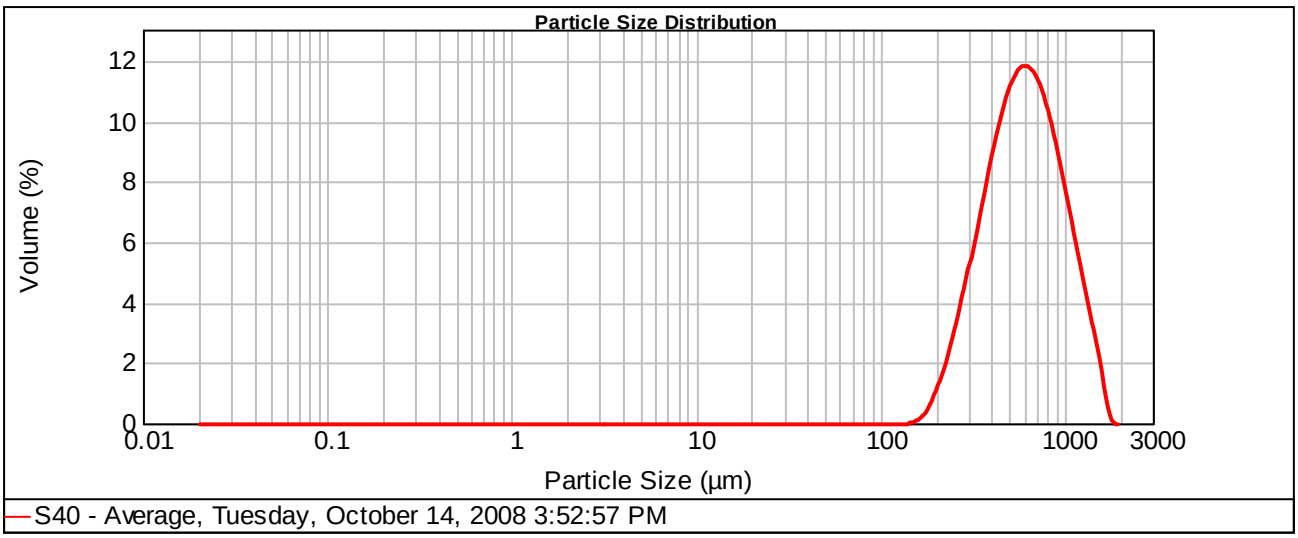

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	3.49
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.02	1445.440	1.96
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	0.19	1659.587	0.18
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	0.80	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	1.66	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	2.89	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	4.39	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	6.08	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	7.75	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	9.20	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	10.23	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	10.69	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	10.50	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	9.69	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	8.38	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	6.78	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	5.11		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	5.11		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S41 - Average

SOP Name:

Measured:
Tuesday, October 14, 2008 4:03:15 PM

Sample Source & type:
Thiruvadandhai

Measured by:
Unknown

Analysed:
Tuesday, October 14, 2008 4:03:17 PM

Sample bulk lot ref:
Pit 3 150m

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
22.78 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
2.782 %

Result Emulation:
Off

Concentration:
2.3139 %Vol

Span :
1.284

Uniformity:
0.395

Result units:
Volume

Specific Surface Area:
0.00952 m²/g

Surface Weighted Mean D[3,2]:
629.949 um

Vol. Weighted Mean D[4,3]:
777.372 um

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d(0.1): 378.668 um **d(0.5):** 708.049 um **d(0.9):** 1287.451 um

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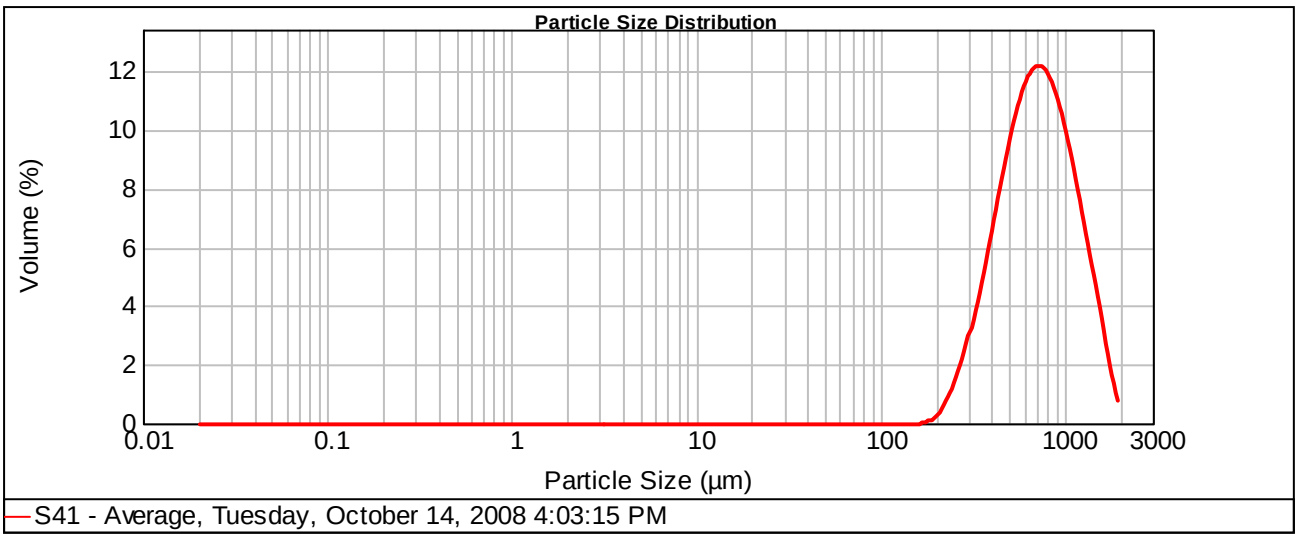


Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	5.40
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.00	1445.440	3.62
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	0.01	1659.587	1.67
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	0.13	1905.461	0.31
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	0.59	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	1.35	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	2.46	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	3.94	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	5.64	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	7.42	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	9.05	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	10.29	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	10.95	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	10.91	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	10.18	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	8.88	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	7.20		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S42 - Average

SOP Name:

Measured:
Tuesday, October 14, 2008 4:12:50 PM

Sample Source & type:
Thiruvadandhai

Measured by:
Unknown

Analysed:
Tuesday, October 14, 2008 4:12:51 PM

Sample bulk lot ref:
Pit 3 150m

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
21.25 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
2.674 %

Result Emulation:
Off

Concentration:
2.0509 %Vol

Span :
1.271

Uniformity:
0.391

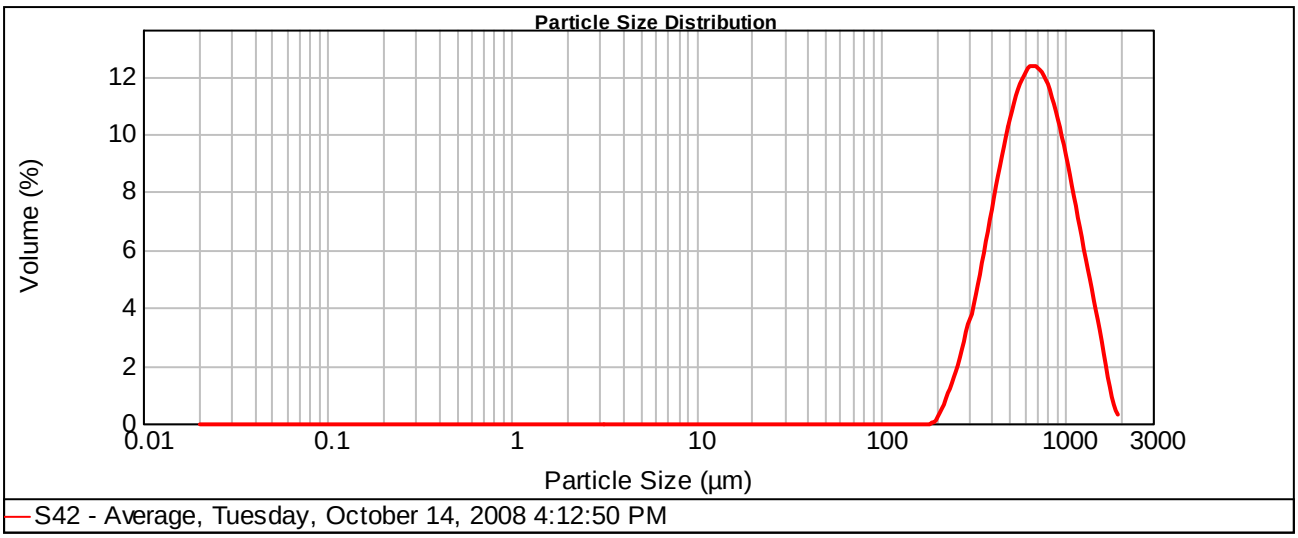
Result units:
Volume

Specific Surface Area:
0.00992 m²/g

Surface Weighted Mean D[3,2]:
604.577 um

Vol. Weighted Mean D[4,3]:
739.938 um

d(0.1): 366.324 um **d(0.5):** 672.532 um **d(0.9):** 1221.321 um



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	4.69
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.00	1445.440	2.94
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	0.00	1659.587	1.02
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	0.03	1905.461	0.08
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	0.64	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	1.56	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	2.87	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	4.54	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	6.39	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	8.22	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	9.77	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	10.81	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	11.17	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	10.80	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	9.76	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	8.23	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	6.46		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	4.69		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S43 - Average

SOP Name:

Measured:
Tuesday, October 14, 2008 4:22:25 PM

Sample Source & type:
Thiruvadandhai

Measured by:
Unknown

Analysed:
Tuesday, October 14, 2008 4:22:26 PM

Sample bulk lot ref:
Pit 3 150m

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
22.25 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
3.209 %

Result Emulation:
Off

Concentration:
2.4238 %Vol

Span :
1.112

Uniformity:
0.342

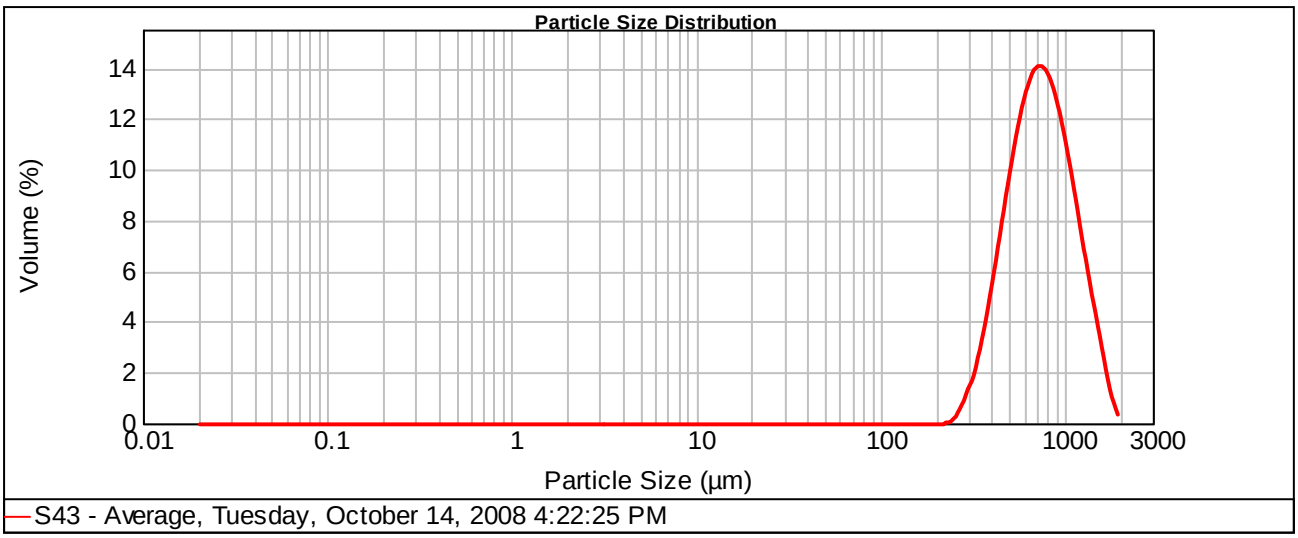
Result units:
Volume

Specific Surface Area:
0.00885 m²/g

Surface Weighted Mean D[3,2]:
678.055 um

Vol. Weighted Mean D[4,3]:
794.711 um

d(0.1): 432.897 um **d(0.5):** 734.541 um **d(0.9):** 1250.069 um



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	5.26
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.00	1445.440	3.14
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	0.00	1659.587	1.14
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	0.00	1905.461	0.13
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	0.00	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	0.22	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	1.05	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	2.52	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	4.55	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	6.98	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	9.41	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	11.41	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	12.57	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	12.64	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	11.63	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	9.80	10000.000	
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	7.53		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S44 - Average

SOP Name:

Measured:
Tuesday, October 14, 2008 4:30:58 PM

Sample Source & type:
Thiruvadandhai

Measured by:
Unknown

Analysed:
Tuesday, October 14, 2008 4:31:00 PM

Sample bulk lot ref:
Pit 3 150m

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
24.38 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.844 %

Result Emulation:
Off

Concentration:
1.8612 %Vol

Span :
1.261

Uniformity:
0.389

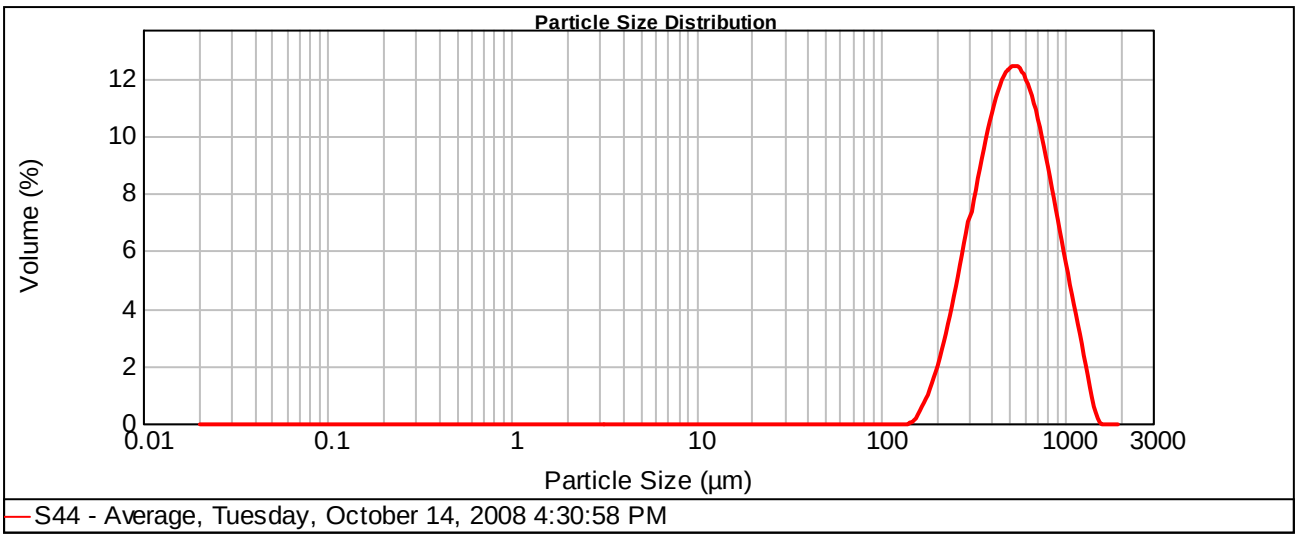
Result units:
Volume

Specific Surface Area:
0.0128 m²/g

Surface Weighted Mean D[3,2]:
468.723 um

Vol. Weighted Mean D[4,3]:
573.029 um

d(0.1): 284.331 um **d(0.5):** 522.139 um **d(0.9):** 942.525 um



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	1.38
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.03	1445.440	0.04
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	0.54	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	1.37	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	2.61	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	4.21	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	6.03	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	7.90	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	9.53	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	10.71	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	11.23	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	11.01	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	10.07	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	8.57	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	6.74	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	4.89	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	3.12		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	1.38		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S45 - Average

SOP Name:

Measured:
Tuesday, October 14, 2008 4:40:31 PM

Sample Source & type:
Thiruvadandhai

Measured by:
Unknown

Analysed:
Tuesday, October 14, 2008 4:40:32 PM

Sample bulk lot ref:
Pit 3 150m

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
21.91 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.645 %

Result Emulation:
Off

Concentration:
1.5429 %Vol

Span :
1.210

Uniformity:
0.371

Result units:
Volume

Specific Surface Area:
0.0137 m²/g

Surface Weighted Mean D[3,2]:
439.253 um

Vol. Weighted Mean D[4,3]:
529.469 um

d(0.1): 269.610 um **d(0.5):** 486.559 um **d(0.9):** 858.585 um

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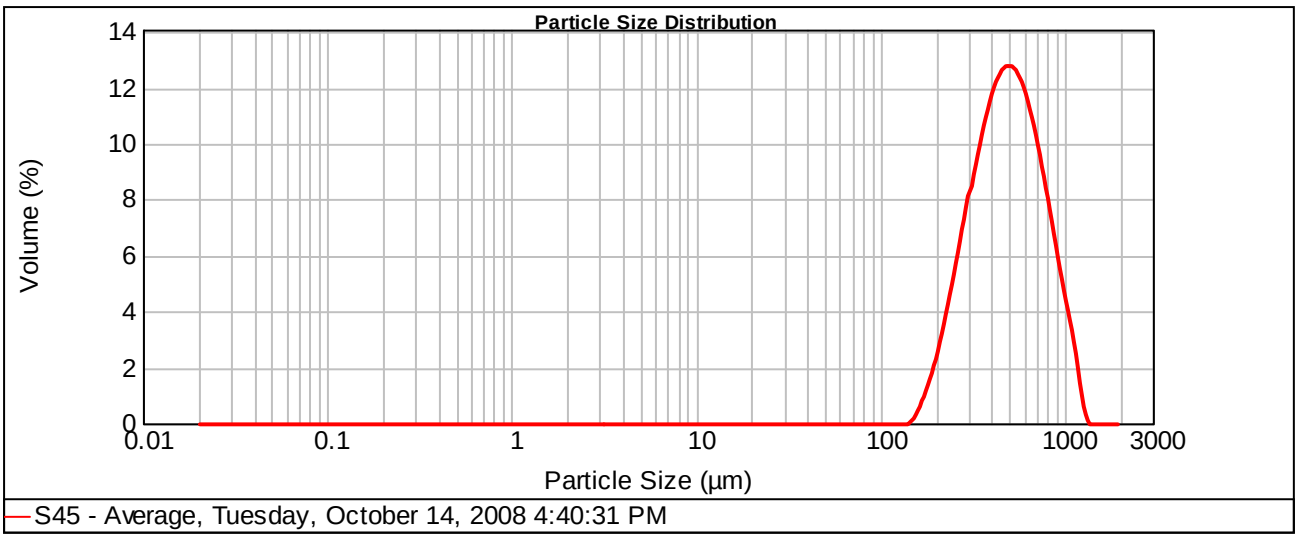

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	0.03
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.05	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	0.76	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	1.78	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	3.25	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	5.06	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	7.02	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	8.91	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	10.43	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	11.36	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	11.54	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	10.92	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	9.61	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	7.81	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	5.78	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	3.84	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	1.86		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	0.03		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S46 - Average

SOP Name:

Measured:
Tuesday, October 14, 2008 4:50:12 PM

Sample Source & type:
Thiruvadandhai

Measured by:
Unknown

Analysed:
Tuesday, October 14, 2008 4:50:13 PM

Sample bulk lot ref:
Pit 3 150m

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
20.36 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
2.402 %

Result Emulation:
Off

Concentration:
1.8296 %Vol

Span :
1.267

Uniformity:
0.387

Result units:
Volume

Specific Surface Area:
0.0106 m²/g

Surface Weighted Mean D[3,2]:
565.590 um

Vol. Weighted Mean D[4,3]:
691.480 um

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d(0.1): 343.337 um **d(0.5):** 629.301 um **d(0.9):** 1140.352 um

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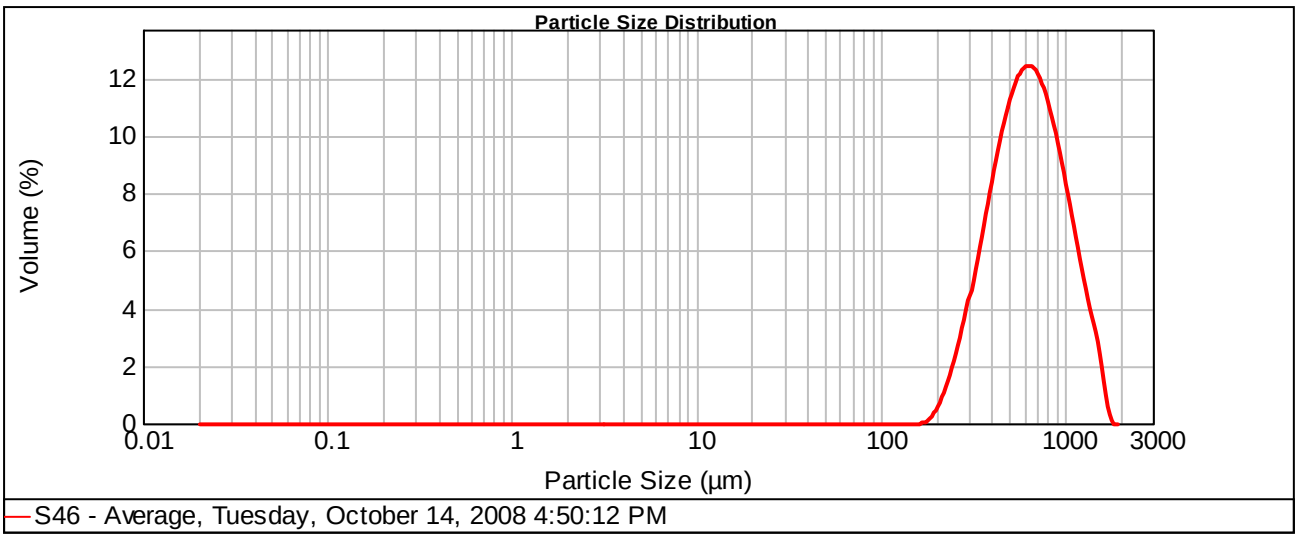


Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	3.81
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.00	1445.440	2.24
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	0.01	1659.587	0.17
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	0.30	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	1.00	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	2.11	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	3.60	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	5.39	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	7.27	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	9.03	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	10.38	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	11.13	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	11.14	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	10.42	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	9.09	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	7.38	10000.000	
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	5.54		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S47 - Average

SOP Name:

Measured:
Tuesday, October 14, 2008 4:58:45 PM

Sample Source & type:
Thiruvadandhai

Measured by:
Unknown

Analysed:
Tuesday, October 14, 2008 4:58:47 PM

Sample bulk lot ref:
Pit 3 150m

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
23.12 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.709 %

Result Emulation:
Off

Concentration:
1.5649 %Vol

Span :
1.318

Uniformity:
0.409

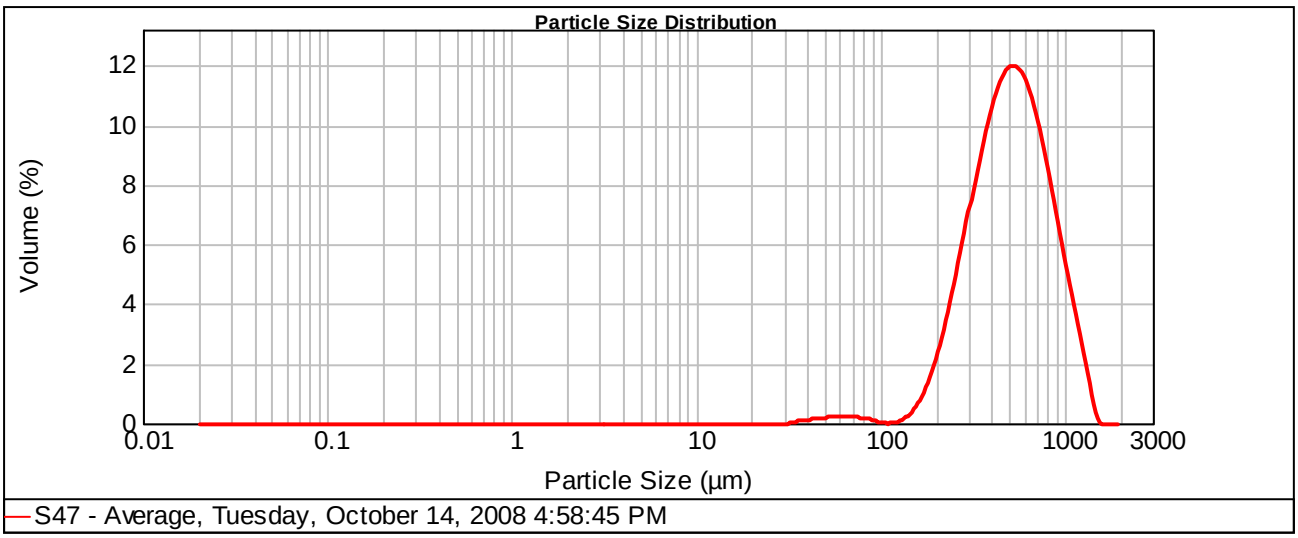
Result units:
Volume

Specific Surface Area:
0.0143 m²/g

Surface Weighted Mean D[3,2]:
419.648 um

Vol. Weighted Mean D[4,3]:
558.156 um

d(0.1): 264.462 um **d(0.5):** 508.657 um **d(0.9):** 935.060 um



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.08	1258.925	1.41
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.33	1445.440	0.05
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	0.84	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	1.70	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	2.90	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	4.43	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	6.14	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.01	316.228	7.87	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.09	363.078	9.36	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.13	416.869	10.41	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.17	478.630	10.83	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.20	549.541	10.56	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.21	630.957	9.63	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.19	724.436	8.18	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.14	831.764	6.43	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.05	954.993	4.66	10000.000	
0.091	0.00	0.955	0.00	10.000	0.00	104.713	-0.00	1096.478	3.02		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S48 - Average

SOP Name:

Measured:
Wednesday, October 15, 2008 12:58:32 PM

Sample Source & type:
Thiruvadandhai

Measured by:
student

Analysed:
Wednesday, October 15, 2008 12:58:34 PM

Sample bulk lot ref:
Pit 3 150m

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
20.58 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.630 %

Result Emulation:
Off

Concentration:
1.9522 %Vol

Span :
1.321

Uniformity:
0.406

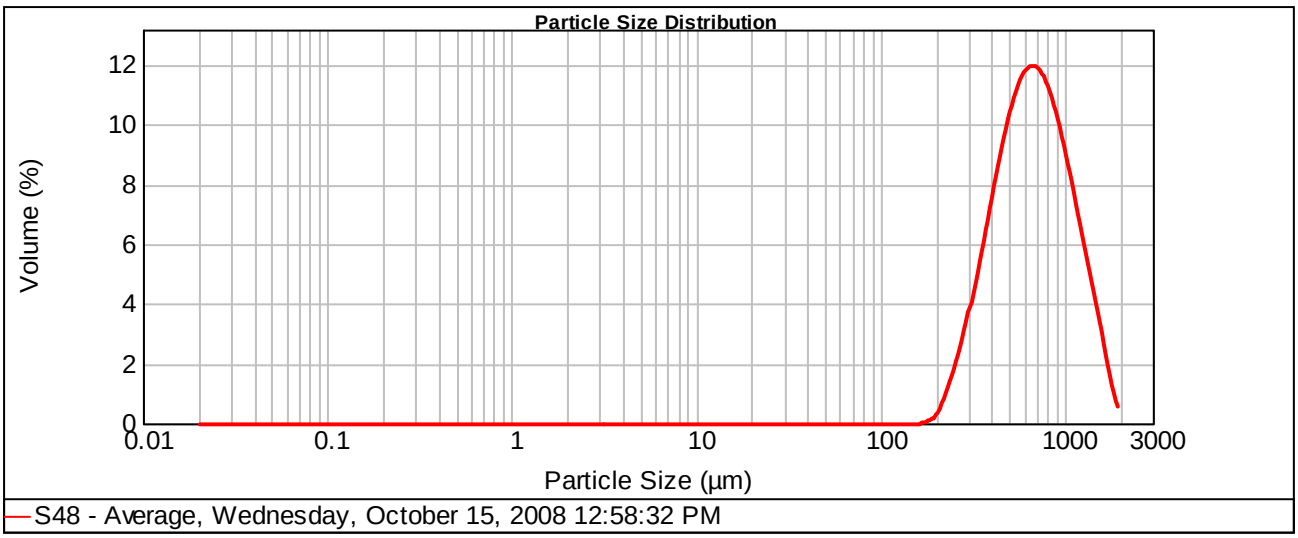
Result units:
Volume

Specific Surface Area:
0.0101 m²/g

Surface Weighted Mean D[3,2]:
596.766 um

Vol. Weighted Mean D[4,3]:
740.214 um

d(0.1): 357.420 um **d(0.5):** 667.435 um **d(0.9):** 1239.316 um



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	4.73
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.00	1445.440	3.10
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	0.01	1659.587	1.32
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	0.16	1905.461	0.21
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	0.80	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	1.78	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	3.12	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	4.76	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	6.53	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	8.24	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	9.64	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	10.55	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	10.81	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	10.41	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	9.42	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	8.01	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	6.38		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S49 - Average

SOP Name:

Measured:
Wednesday, October 15, 2008 1:09:29 PM

Sample Source & type:
Thiruvadandhai

Measured by:
student

Analysed:
Wednesday, October 15, 2008 1:09:30 PM

Sample bulk lot ref:
Pit 3 150m

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
20.86 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.342 %

Result Emulation:
Off

Concentration:
1.7413 %Vol

Span :
1.338

Uniformity:
0.412

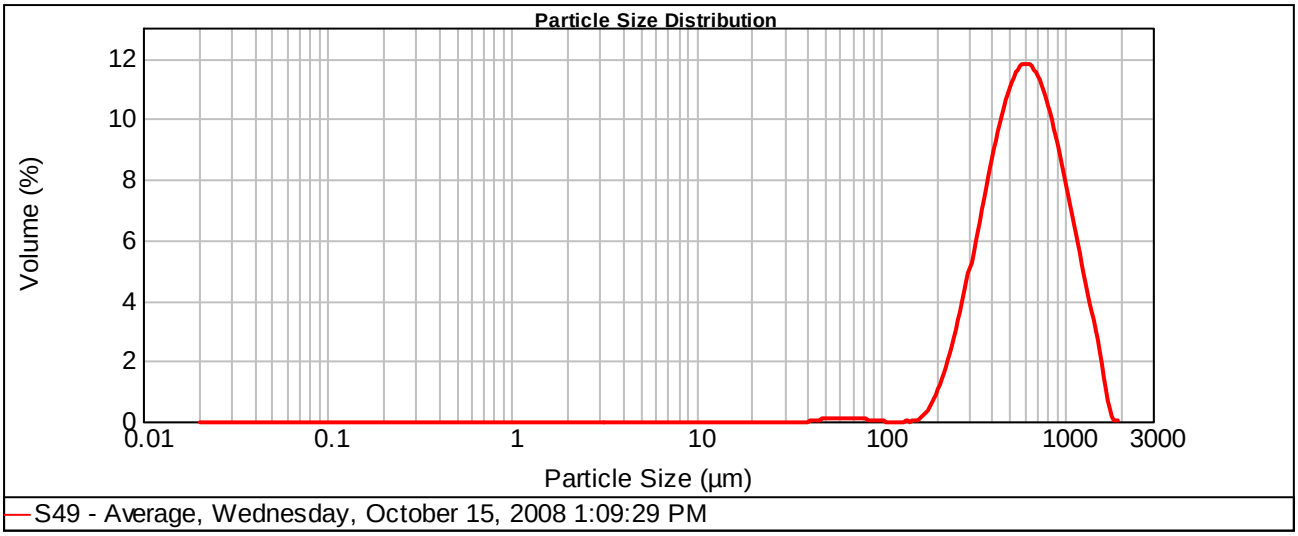
Result units:
Volume

Specific Surface Area:
0.0114 m²/g

Surface Weighted Mean D[3,2]:
524.297 um

Vol. Weighted Mean D[4,3]:
673.027 um

d(0.1): 320.071 um **d(0.5):** 608.250 um **d(0.9):** 1133.712 um



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	3.69
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	-0.00	1445.440	2.16
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	0.13	1659.587	0.26
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	0.65	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	1.48	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	2.67	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	4.16	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	5.86	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	7.56	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.01	416.869	9.06	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.07	478.630	10.15	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.09	549.541	10.65	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.11	630.957	10.51	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.10	724.436	9.75	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.06	831.764	8.50	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.01	954.993	6.96	10000.000	
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	5.33		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S50 - Average

SOP Name:

Measured:
Wednesday, October 15, 2008 1:23:14 PM

Sample Source & type:
Thiruvadandhai

Measured by:
student

Analysed:
Wednesday, October 15, 2008 1:23:16 PM

Sample bulk lot ref:
Pit 3 150m

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
22.96 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.375 %

Result Emulation:
Off

Concentration:
1.9104 %Vol

Span :
1.266

Uniformity:
0.389

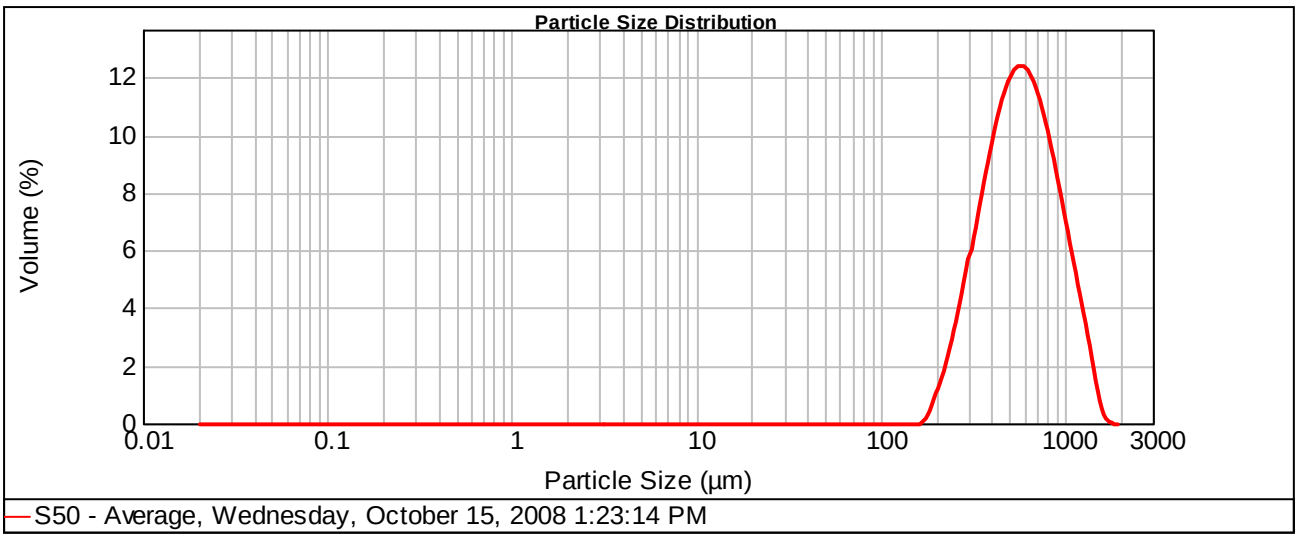
Result units:
Volume

Specific Surface Area:
0.0116 m²/g

Surface Weighted Mean D[3,2]:
515.921 um

Vol. Weighted Mean D[4,3]:
630.063 um

d(0.1): 313.233 um **d(0.5):** 572.793 um **d(0.9):** 1038.479 um



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	2.64
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.00	1445.440	0.75
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	0.03	1659.587	0.02
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	0.73	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	1.70	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	3.11	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	4.83	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	6.72	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	8.53	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	10.03	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	10.96	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	11.20	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	10.70	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	9.55	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	7.96	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	6.17	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	4.39		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S51 - Average

SOP Name:

Measured:
Wednesday, October 15, 2008 1:34:55 PM

Sample Source & type:
Thiruvadandhai

Measured by:
student

Analysed:
Wednesday, October 15, 2008 1:34:56 PM

Sample bulk lot ref:
Pit 4

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
22.38 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.223 %

Result Emulation:
Off

Concentration:
1.8432 %Vol

Span :
1.232

Uniformity:
0.378

Result units:
Volume

Specific Surface Area:
0.0117 m²/g

Surface Weighted Mean D[3,2]:
512.024 um

Vol. Weighted Mean D[4,3]:
619.101 um

d(0.1): 315.369 um **d(0.5):** 563.792 um **d(0.9):** 1009.845 um

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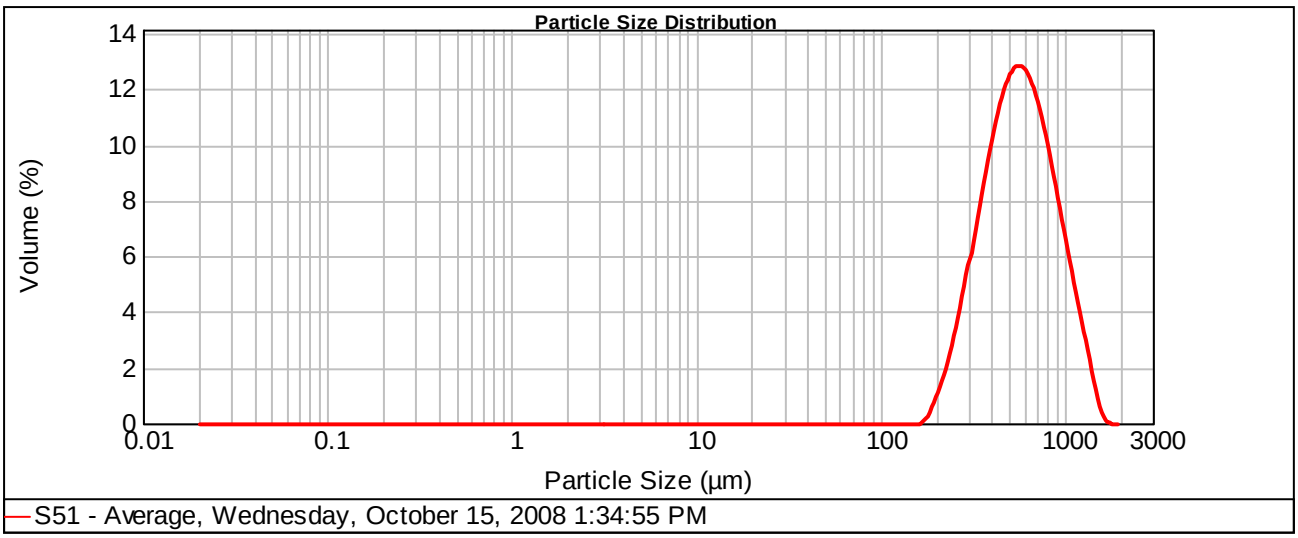

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	2.25
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.00	1445.440	0.57
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	0.02	1659.587	0.01
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	0.64	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	1.58	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	3.02	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	4.85	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	6.91	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	8.89	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	10.50	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	11.44	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	11.56	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	10.86	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	9.48	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	7.69	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	5.79	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	3.96		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S52 - Average

SOP Name:

Measured:
Wednesday, October 15, 2008 1:45:59 PM

Sample Source & type:
Thiruvadandhai

Measured by:
student

Analysed:
Wednesday, October 15, 2008 1:46:01 PM

Sample bulk lot ref:
Pit 4

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
23.72 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.777 %

Result Emulation:
Off

Concentration:
0.5757 %Vol

Span :
1.574

Uniformity:
0.491

Result units:
Volume

Specific Surface Area:
0.0381 m²/g

Surface Weighted Mean D[3,2]:
157.382 um

Vol. Weighted Mean D[4,3]:
494.933 um

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d(0.1): 192.277 um **d(0.5):** 444.016 um **d(0.9):** 891.282 um

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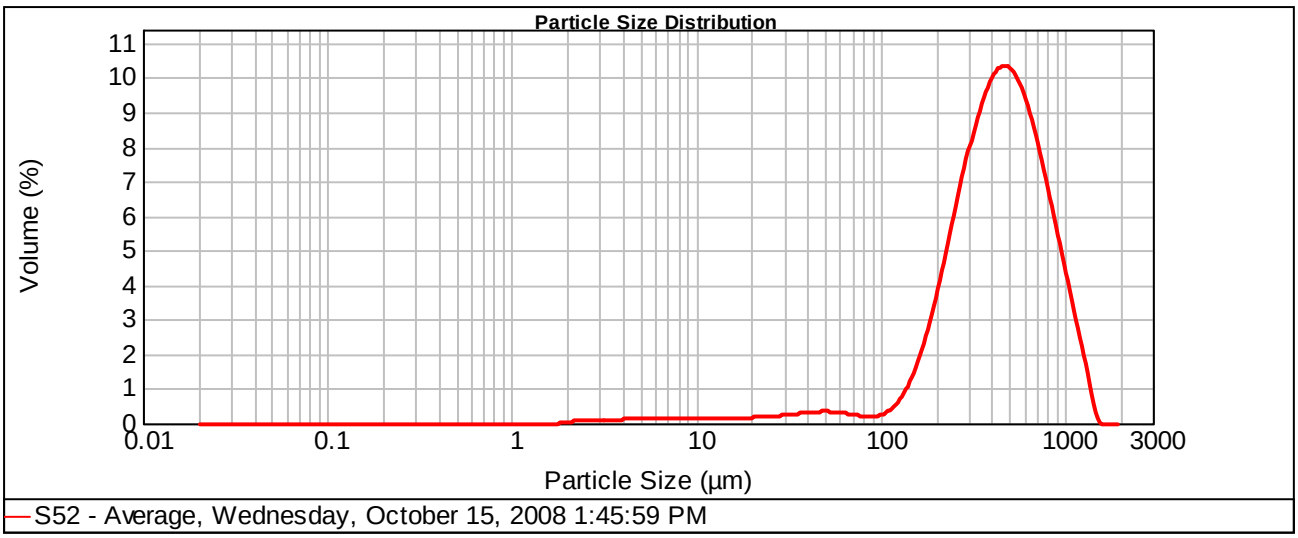


Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.15	120.226	0.64	1258.925	1.20
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.15	138.038	1.17	1445.440	0.04
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.15	158.489	1.96	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.15	181.970	3.01	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.04	19.953	0.16	208.930	4.25	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.06	22.909	0.17	239.883	5.61	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.07	26.303	0.20	275.423	6.94	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.08	30.200	0.23	316.228	8.09	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.09	34.674	0.27	363.078	8.92	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.10	39.811	0.30	416.869	9.32	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.11	45.709	0.31	478.630	9.23	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.12	52.481	0.30	549.541	8.68	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.13	60.256	0.26	630.957	7.73	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.14	69.183	0.22	724.436	6.51	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.15	79.433	0.18	831.764	5.17	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.15	91.201	0.20	954.993	3.84	10000.000	
0.091	0.00	0.955	0.00	10.000	0.15	104.713	0.34	1096.478	2.50		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S53 - Average

SOP Name:

Measured:
Wednesday, October 15, 2008 1:55:23 PM

Sample Source & type:
Thiruvadandhai

Measured by:
student

Analysed:
Wednesday, October 15, 2008 1:55:24 PM

Sample bulk lot ref:
Pit 4

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
22.01 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.035 %

Result Emulation:
Off

Concentration:
1.5154 %Vol

Span :
1.330

Uniformity:
0.407

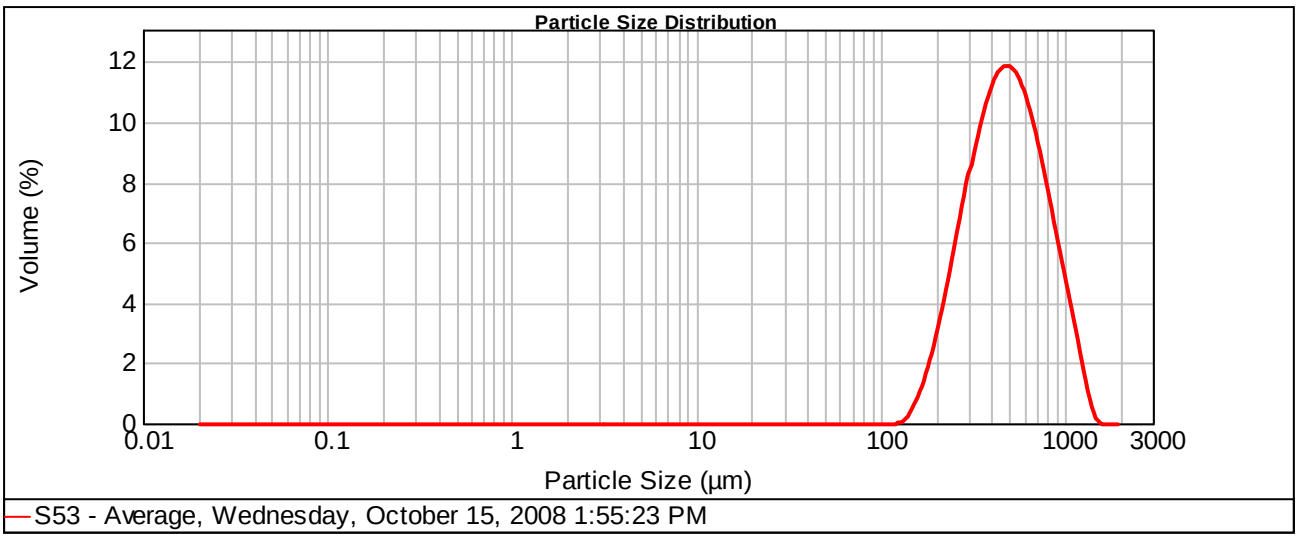
Result units:
Volume

Specific Surface Area:
0.014 m²/g

Surface Weighted Mean D[3,2]:
429.306 um

Vol. Weighted Mean D[4,3]:
534.014 um

d(0.1): 256.337 um **d(0.5):** 480.998 um **d(0.9):** 896.299 um



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.03	1258.925	0.86
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.39	1445.440	0.02
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	1.15	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	2.29	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	3.74	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	5.45	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	7.18	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	8.77	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	9.97	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	10.63	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	10.66	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	10.05	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	8.92	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	7.43	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	5.78	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	4.15	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	2.52		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	0.03		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S54 - Average

SOP Name:

Measured:
Wednesday, October 15, 2008 2:03:25 PM

Sample Source & type:
Thiruvadandhai

Measured by:
student

Analysed:
Wednesday, October 15, 2008 2:03:26 PM

Sample bulk lot ref:
Pit 4

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
25.52 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.400 %

Result Emulation:
Off

Concentration:
1.9560 %Vol

Span :
1.381

Uniformity:
0.426

Result units:
Volume

Specific Surface Area:
0.0128 m²/g

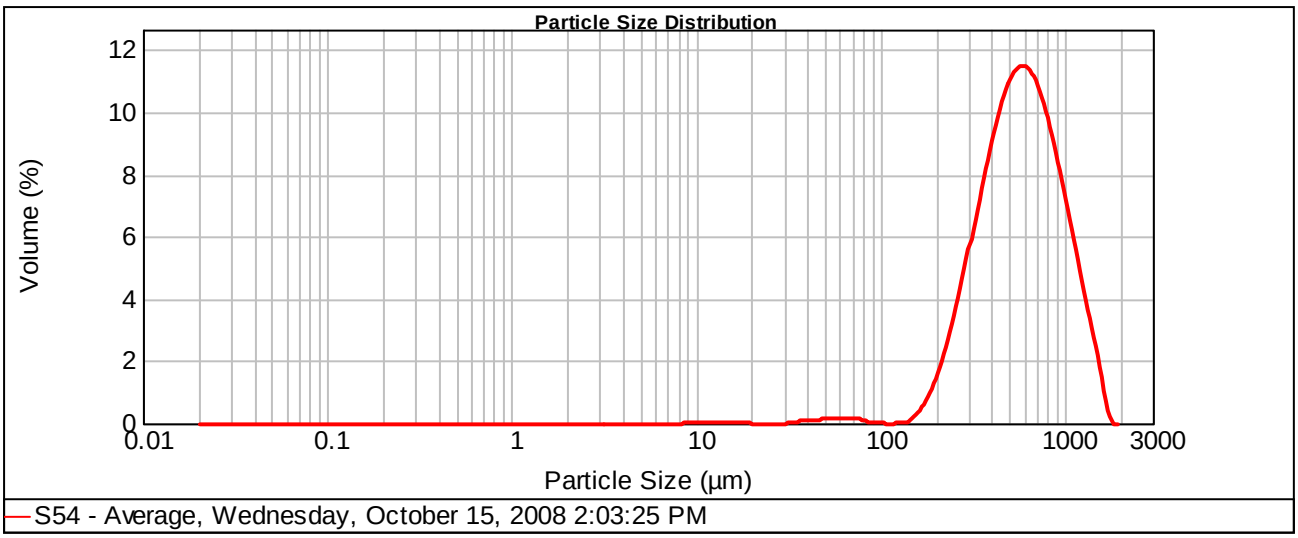
Surface Weighted Mean D[3,2]:
467.221 um

Vol. Weighted Mean D[4,3]:
639.487 um

---

d(0.1): 294.252 um **d(0.5):** 576.546 um **d(0.9):** 1090.376 um

---



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.01	120.226	0.00	1258.925	3.19
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.01	138.038	0.12	1445.440	1.70
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.01	158.489	0.48	1659.587	0.12
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	1.11	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	2.05	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	3.30	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	4.79	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.01	316.228	6.40	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.07	363.078	7.95	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.09	416.869	9.25	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.12	478.630	10.10	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.14	549.541	10.39	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.15	630.957	10.06	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.13	724.436	9.18	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.06	831.764	7.87	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.01	91.201	0.00	954.993	6.33	10000.000	
0.091	0.00	0.955	0.00	10.000	0.01	104.713	0.00	1096.478	4.77		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S55 - Average

SOP Name:

Measured:
Wednesday, October 15, 2008 2:12:29 PM

Sample Source & type:
Thiruvadandhai

Measured by:
student

Analysed:
Wednesday, October 15, 2008 2:12:31 PM

Sample bulk lot ref:
Pit 4

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
19.48 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.512 %

Result Emulation:
Off

Concentration:
1.7253 %Vol

Span :
1.343

Uniformity:
0.411

Result units:
Volume

Specific Surface Area:
0.0107 m²/g

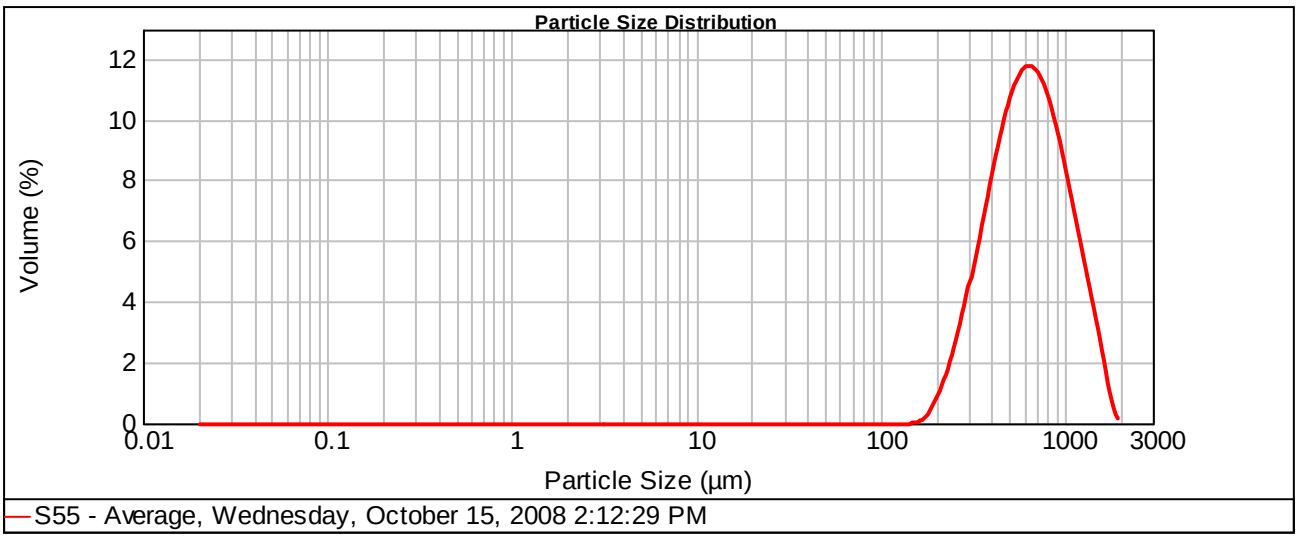
Surface Weighted Mean D[3,2]:
560.610 um

Vol. Weighted Mean D[4,3]:
701.929 um

---

d(0.1): 332.563 um **d(0.5):** 632.657 um **d(0.9):** 1182.238 um

---



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	4.16
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.01	1445.440	2.57
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	0.09	1659.587	0.81
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	0.58	1905.461	0.03
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	1.31	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	2.41	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	3.81	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	5.44	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	7.11	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	8.66	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	9.85	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	10.52	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	10.57	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	9.99	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	8.88	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	7.41	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	5.78		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	4.16		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S56 - Average

SOP Name:

Measured:
Wednesday, October 15, 2008 2:22:32 PM

Sample Source & type:
Thiruvadandhai

Measured by:
student

Analysed:
Wednesday, October 15, 2008 2:22:34 PM

Sample bulk lot ref:
Pit 7

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
19.01 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.564 %

Result Emulation:
Off

Concentration:
1.6164 %Vol

Span :
1.335

Uniformity:
0.41

Result units:
Volume

Specific Surface Area:
0.0111 m²/g

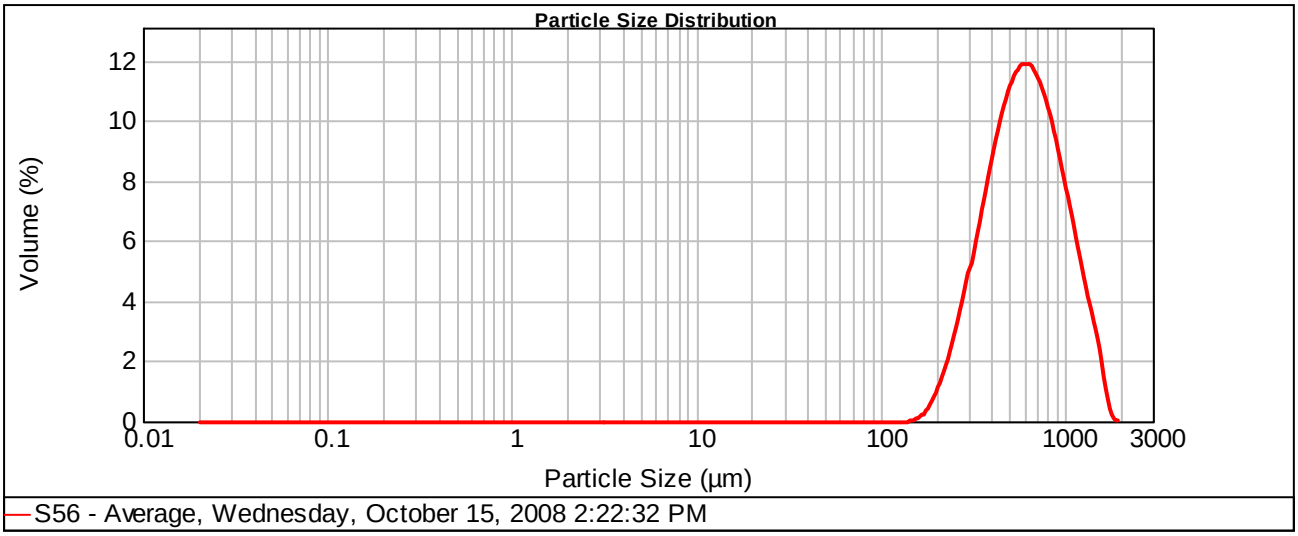
Surface Weighted Mean D[3,2]:
539.880 um

Vol. Weighted Mean D[4,3]:
673.798 um

---

d(0.1): 321.722 um **d(0.5):** 607.725 um **d(0.9):** 1133.183 um

---



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	3.66
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.02	1445.440	2.18
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	0.19	1659.587	0.29
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	0.72	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	1.52	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	2.71	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	4.20	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	5.90	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	7.61	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	9.13	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	10.21	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	10.71	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	10.55	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	9.76	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	8.47	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	6.90	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	5.27		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	3.66		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S57 - Average

SOP Name:

Measured:
Wednesday, October 15, 2008 2:31:01 PM

Sample Source & type:
Thiruvadandhai

Measured by:
student

Analysed:
Wednesday, October 15, 2008 2:31:03 PM

Sample bulk lot ref:
Old Dune

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
22.22 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.012 %

Result Emulation:
Off

Concentration:
1.3662 %Vol

Span :
1.299

Uniformity:
0.401

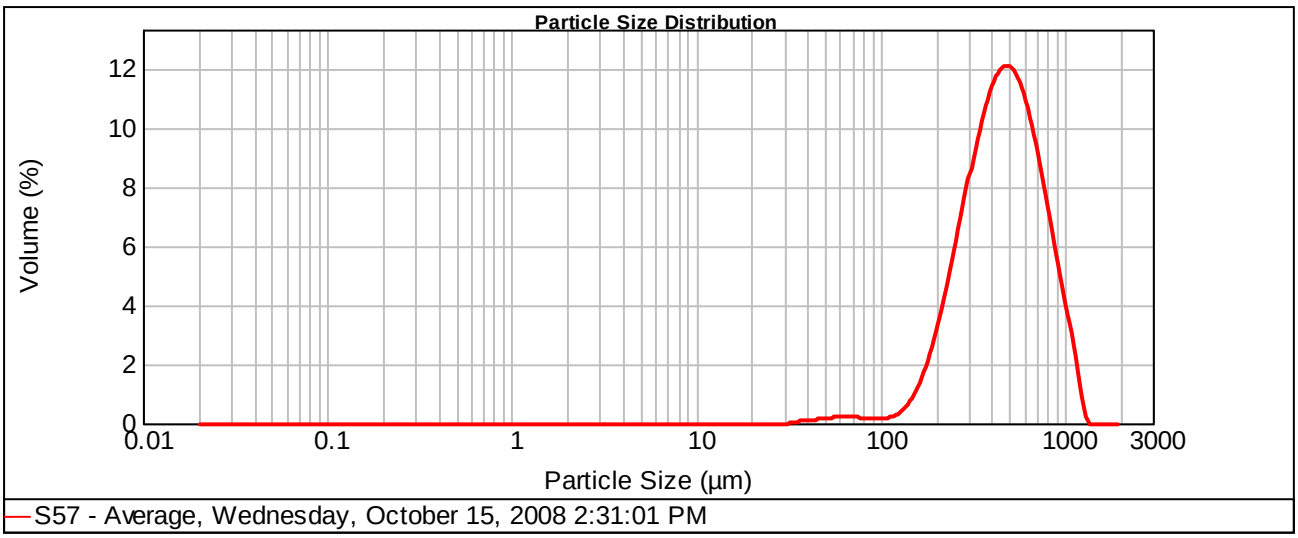
Result units:
Volume

Specific Surface Area:
0.0156 m²/g

Surface Weighted Mean D[3,2]:
383.446 um

Vol. Weighted Mean D[4,3]:
503.518 um

d(0.1): 238.210 um **d(0.5):** 462.479 um **d(0.9):** 838.847 um



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.35	1258.925	0.03
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.75	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	1.44	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	2.48	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	3.84	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	5.49	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	7.21	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.01	316.228	8.85	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.07	363.078	10.12	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.11	416.869	10.83	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.15	478.630	10.84	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.18	549.541	10.14	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.20	630.957	8.82	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.18	724.436	7.10	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.15	831.764	5.23	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.14	954.993	3.46	10000.000	
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.18	1096.478	1.66		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S58 - Average

SOP Name:

Measured:
Wednesday, October 15, 2008 2:44:32 PM

Sample Source & type:
Kovalam

Measured by:
student

Analysed:
Wednesday, October 15, 2008 2:44:34 PM

Sample bulk lot ref:
Pit 1

Result Source:
Edited

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
26.80 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.815 %

Result Emulation:
Off

Concentration:
1.4033 %Vol

Span :
1.339

Uniformity:
0.415

Result units:
Volume

Specific Surface Area:
0.0189 m²/g

Surface Weighted Mean D[3,2]:
317.527 um

Vol. Weighted Mean D[4,3]:
430.984 um

d(0.1): 202.404 um **d(0.5):** 391.754 um **d(0.9):** 727.107 um

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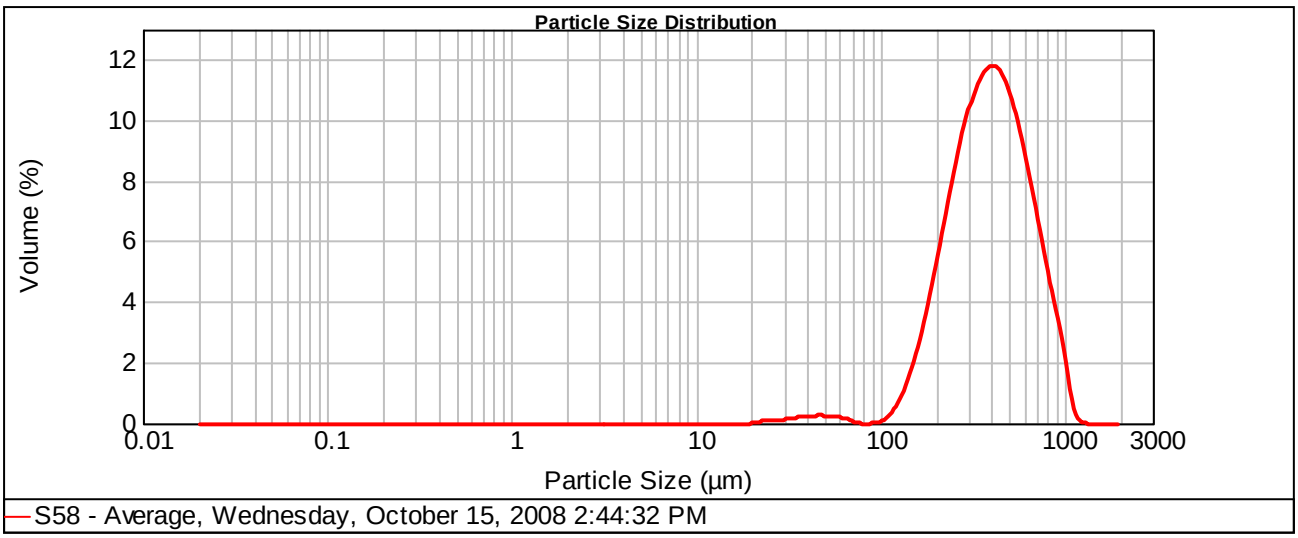


Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.76	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	1.61	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	2.80	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	4.32	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.02	208.930	6.00	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.08	239.883	7.69	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.10	275.423	9.15	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.15	316.228	10.19	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.19	363.078	10.63	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.23	416.869	10.43	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.23	478.630	9.61	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.20	549.541	8.30	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.14	630.957	6.70	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.02	724.436	4.98	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	3.39	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.03	954.993	1.67	10000.000	
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.26	1096.478	0.12		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S59 - Average

SOP Name:

Measured:
Wednesday, October 15, 2008 2:54:19 PM

Sample Source & type:
Kovalam

Measured by:
student

Analysed:
Wednesday, October 15, 2008 2:54:20 PM

Sample bulk lot ref:
Pit 1

Result Source:
Edited

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
22.64 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.015 %

Result Emulation:
Off

Concentration:
1.4225 %Vol

Span :
1.343

Uniformity:
0.413

Result units:
Volume

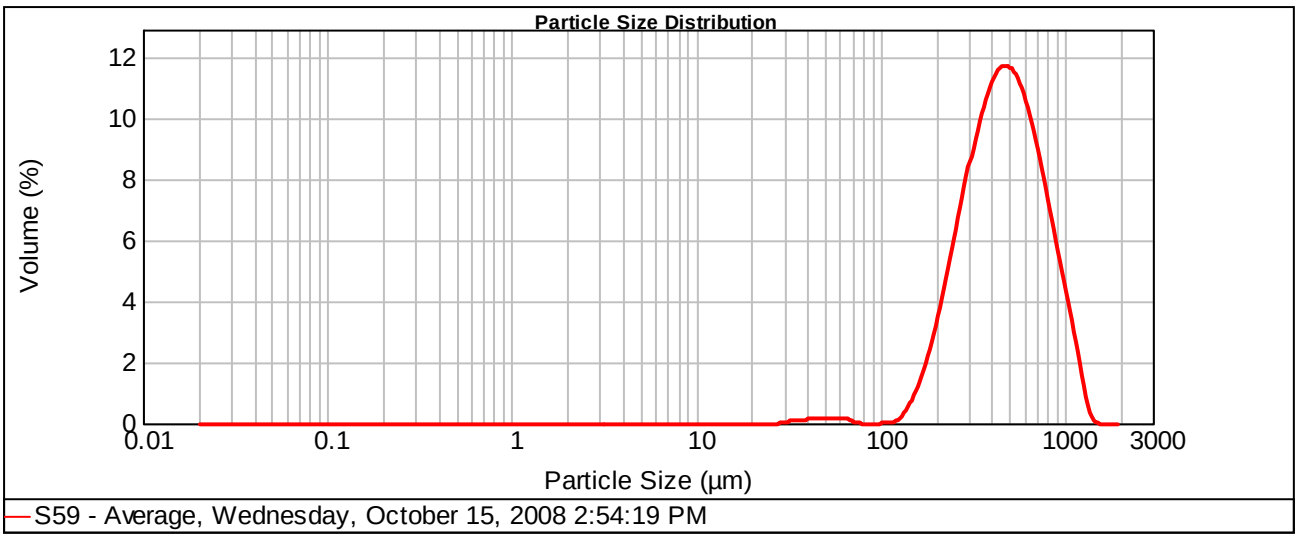
Specific Surface Area:
0.0154 m²/g

Surface Weighted Mean D[3,2]:
390.733 um

Vol. Weighted Mean D[4,3]:
514.028 um

d(0.1): 241.727 um **d(0.5):** 465.599 um **d(0.9):** 866.928 um

---



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.18	1258.925	0.45
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.67	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	1.45	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	2.60	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	4.03	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	5.68	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.01	275.423	7.34	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.06	316.228	8.85	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.10	363.078	9.97	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.14	416.869	10.55	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.16	478.630	10.50	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.16	549.541	9.83	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.14	630.957	8.64	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.02	724.436	7.10	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	5.43	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	3.79	10000.000	
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.01	1096.478	2.14		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S60 - Average

SOP Name:

Measured:
Wednesday, October 15, 2008 3:04:45 PM

Sample Source & type:
Kovalam

Measured by:
student

Analysed:
Wednesday, October 15, 2008 3:04:46 PM

Sample bulk lot ref:
Pit 1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
21.70 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.289 %

Result Emulation:
Off

Concentration:
1.6091 %Vol

Span :
1.289

Uniformity:
0.397

Result units:
Volume

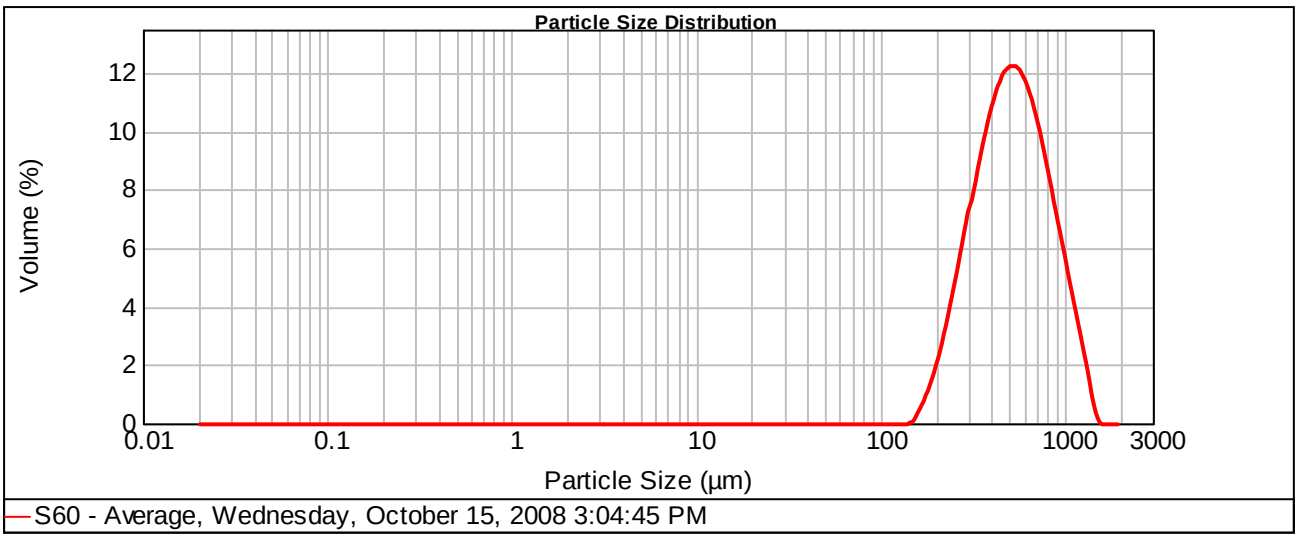
Specific Surface Area:
0.013 m²/g

Surface Weighted Mean D[3,2]:
463.227 um

Vol. Weighted Mean D[4,3]:
569.243 um

d(0.1): 279.798 um **d(0.5):** 515.912 um **d(0.9):** 944.585 um

---



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	1.48
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.04	1445.440	0.05
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	0.61	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	1.50	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	2.80	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	4.44	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	6.25	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	8.07	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	9.61	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	10.67	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	11.07	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	10.75	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	9.78	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	8.30	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	6.56	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	4.86	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	3.15		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S61 - Average

SOP Name:

Measured:
Wednesday, October 15, 2008 3:12:40 PM

Sample Source & type:
Kovalam

Measured by:
student

Analysed:
Wednesday, October 15, 2008 3:12:42 PM

Sample bulk lot ref:
Pit 1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
23.92 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.793 %

Result Emulation:
Off

Concentration:
1.2955 %Vol

Span :
1.327

Uniformity:
0.409

Result units:
Volume

Specific Surface Area:
0.018 m²/g

Surface Weighted Mean D[3,2]:
334.232 um

Vol. Weighted Mean D[4,3]:
434.807 um

---

d(0.1): 206.963 um **d(0.5):** 394.371 um **d(0.9):** 730.429 um

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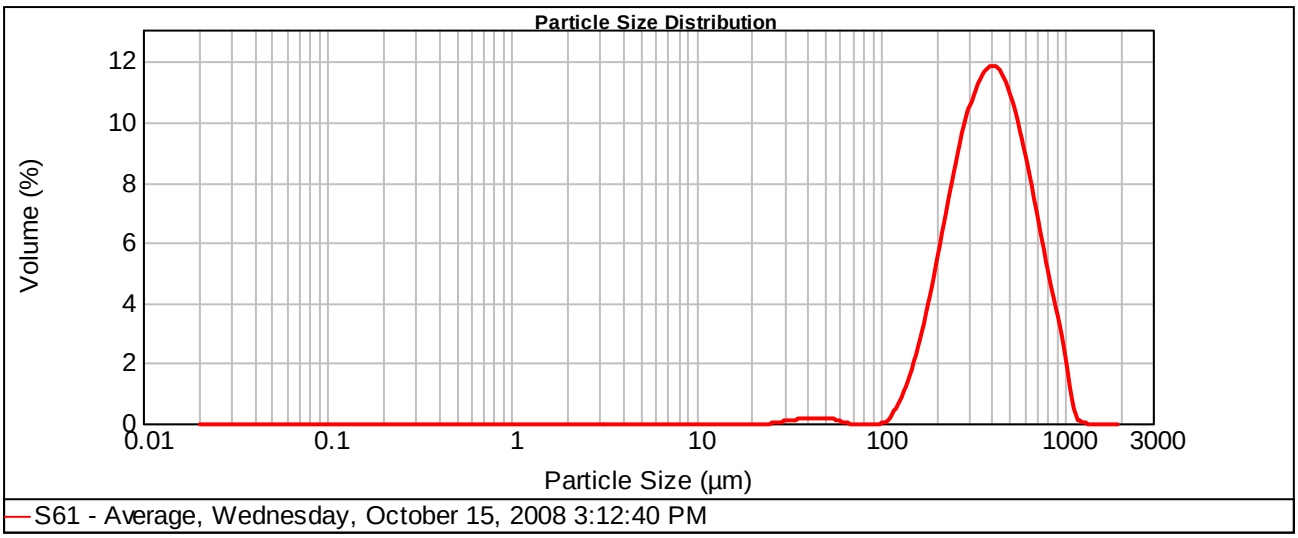

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.73	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	1.59	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	2.80	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	4.34	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	6.04	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	7.75	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.04	275.423	9.21	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.10	316.228	10.26	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.14	363.078	10.71	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.16	416.869	10.51	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.16	478.630	9.69	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.12	549.541	8.37	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.01	630.957	6.77	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	5.05	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	3.46	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	1.74	10000.000	
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.15	1096.478	0.11		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.15	1258.925	0.11		

Operator notes: *Average of 4 measurements from Kov Pit1*

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S62 - Average

SOP Name:

Measured:
Wednesday, October 15, 2008 3:22:54 PM

Sample Source & type:
Kovalam

Measured by:
student

Analysed:
Wednesday, October 15, 2008 3:22:56 PM

Sample bulk lot ref:
Pit 1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
22.31 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.617 %

Result Emulation:
Off

Concentration:
1.1594 %Vol

Span :
1.352

Uniformity:
0.418

Result units:
Volume

Specific Surface Area:
0.0185 m²/g

Surface Weighted Mean D[3,2]:
323.756 um

Vol. Weighted Mean D[4,3]:
423.374 um

d(0.1): 196.785 um **d(0.5):** 383.828 um **d(0.9):** 715.816 um

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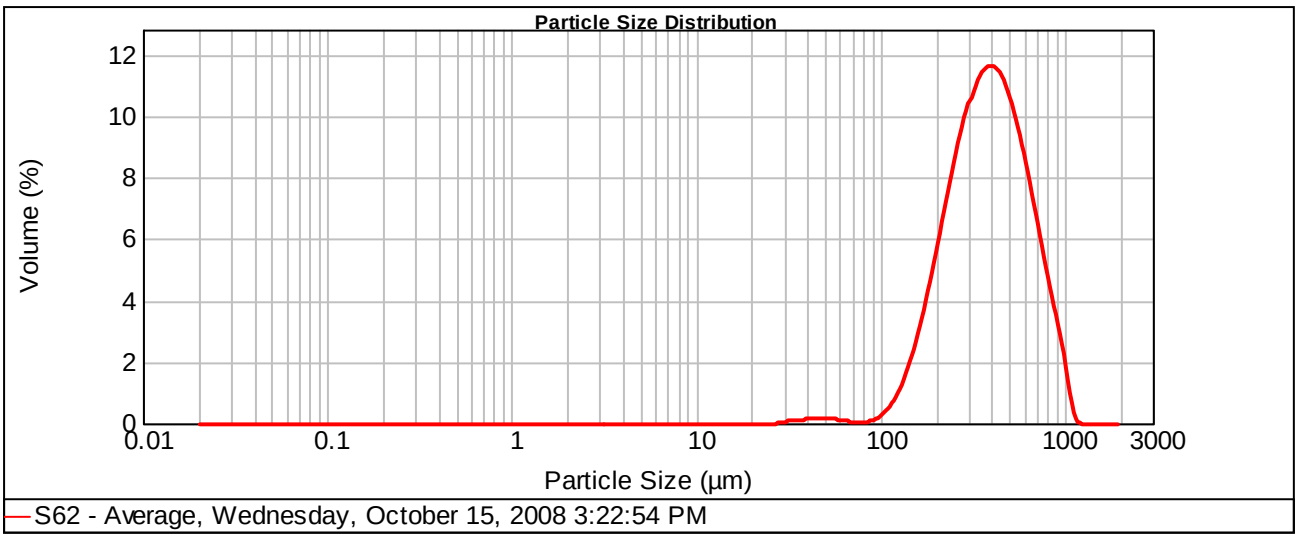

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	1.06	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	1.95	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	3.16	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	4.65	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	6.27	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	7.88	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	9.24	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.02	316.228	10.17	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.08	363.078	10.53	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.11	416.869	10.26	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.13	478.630	9.40	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.14	549.541	8.07	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.12	630.957	6.46	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.08	724.436	4.77	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.01	831.764	3.19	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.04	954.993	1.51	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.18	1096.478	0.04		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.48	1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S63 - Average

SOP Name:

Measured:
Wednesday, October 15, 2008 3:31:37 PM

Sample Source & type:
Kovalam

Measured by:
student

Analysed:
Wednesday, October 15, 2008 3:31:39 PM

Sample bulk lot ref:
Pit 1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
19.90 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.547 %

Result Emulation:
Off

Concentration:
0.9377 %Vol

Span :
1.282

Uniformity:
0.394

Result units:
Volume

Specific Surface Area:
0.0201 m²/g

Surface Weighted Mean D[3,2]:
297.959 um

Vol. Weighted Mean D[4,3]:
378.309 um

d(0.1): 184.644 um **d(0.5):** 345.184 um **d(0.9):** 627.269 um

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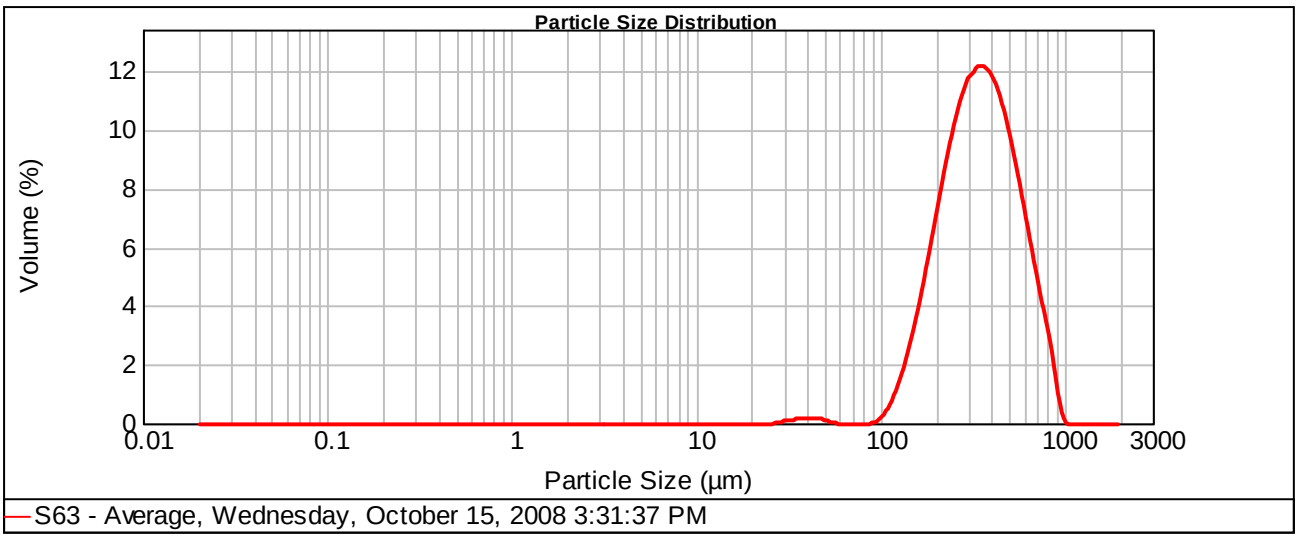

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	1.40	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	2.63	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	4.18	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	5.97	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	7.76	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	9.36	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.04	275.423	10.49	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.11	316.228	11.01	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.14	363.078	10.82	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.15	416.869	9.96	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.12	478.630	8.57	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	6.85	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	5.02	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	3.33	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	1.40	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.09	954.993	0.01	10000.000	
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.57	1096.478	0.00		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S64 - Average

SOP Name:

Measured:
Wednesday, October 15, 2008 3:39:44 PM

Sample Source & type:
Kovalam

Measured by:
student

Analysed:
Wednesday, October 15, 2008 3:39:46 PM

Sample bulk lot ref:
Pit 1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
18.94 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.646 %

Result Emulation:
Off

Concentration:
1.1346 %Vol

Span :
1.278

Uniformity:
0.393

Result units:
Volume

Specific Surface Area:
0.0158 m²/g

Surface Weighted Mean D[3,2]:
380.650 um

Vol. Weighted Mean D[4,3]:
467.260 um

d(0.1): 229.716 um **d(0.5):** 424.833 um **d(0.9):** 772.636 um

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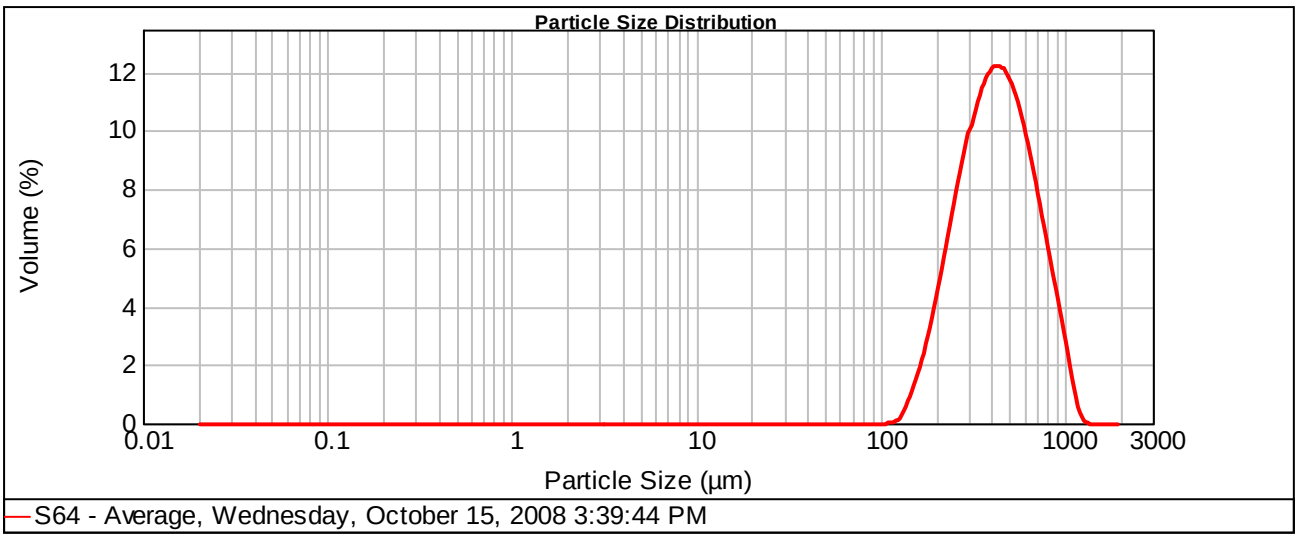


Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.18	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.97	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	2.00	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	3.47	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	5.17	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	7.01	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	8.71	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	10.07	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	10.88	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	11.01	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	10.47	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	9.31	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	7.73	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	5.94	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	4.16	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	2.35	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.02	1096.478	0.55		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.02	1258.925	0.55		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S65 - Average

SOP Name:

Measured:
Wednesday, October 15, 2008 3:47:50 PM

Sample Source & type:
Kovalam

Measured by:
student

Analysed:
Wednesday, October 15, 2008 3:47:51 PM

Sample bulk lot ref:
Pit 1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
21.02 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.503 %

Result Emulation:
Off

Concentration:
0.9863 %Vol

Span :
1.135

Uniformity:
0.353

Result units:
Volume

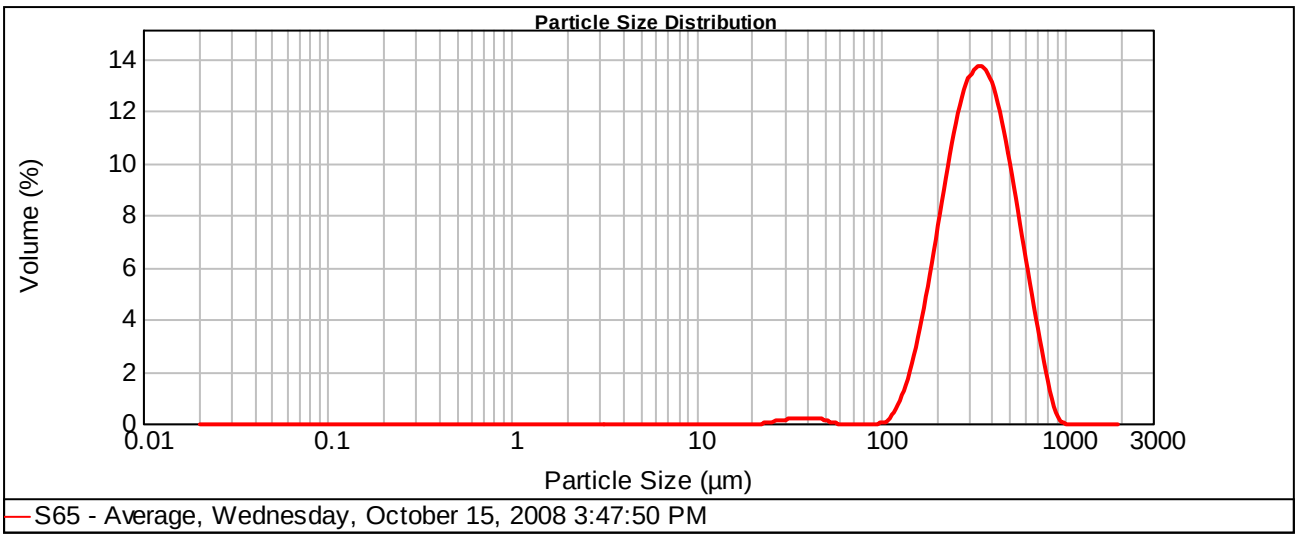
Specific Surface Area:
0.0204 m²/g

Surface Weighted Mean D[3,2]:
294.781 um

Vol. Weighted Mean D[4,3]:
365.405 um

d(0.1): 194.270 um **d(0.5):** 339.354 um **d(0.9):** 579.561 um

---



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.83	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	2.01	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	3.71	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	5.88	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	8.18	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.03	239.883	10.31	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.10	275.423	11.81	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.16	316.228	12.41	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.18	363.078	11.99	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.18	416.869	10.62	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.12	478.630	8.60	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	6.29	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	4.06	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	1.99	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	0.36	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	0.00	10000.000	
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.17	1096.478	0.00		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S66 - Average

SOP Name:

Measured:
Wednesday, October 15, 2008 3:56:17 PM

Sample Source & type:
Kovalam

Measured by:
student

Analysed:
Wednesday, October 15, 2008 3:56:18 PM

Sample bulk lot ref:
Pit 1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
21.08 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.574 %

Result Emulation:
Off

Concentration:
1.0043 %Vol

Span :
1.264

Uniformity:
0.39

Result units:
Volume

Specific Surface Area:
0.0201 m²/g

Surface Weighted Mean D[3,2]:
298.859 um

Vol. Weighted Mean D[4,3]:
365.244 um

d(0.1): 181.501 um **d(0.5):** 332.257 um **d(0.9):** 601.605 um

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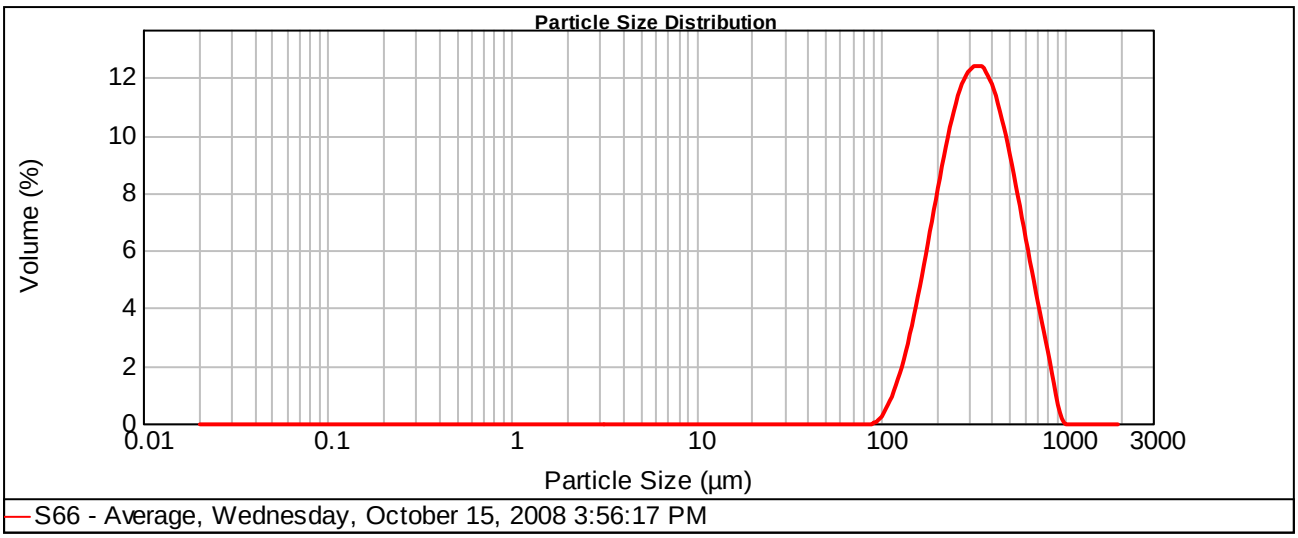

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	1.62	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	3.00	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	4.69	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	6.59	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	8.42	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	9.95	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	10.92	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	11.21	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	10.76	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	9.65	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	8.08	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	6.27	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	4.44	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	2.71	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	0.89	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.10	954.993	0.00	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.68	1096.478	0.00		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.68	1258.925	0.00		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S71 - Average

SOP Name:

Measured:
Wednesday, November 19, 2008 2:49:23 PM

Sample Source & type:
Mamallapuram

Measured by:
student

Analysed:
Wednesday, November 19, 2008 2:49:25 PM

Sample bulk lot ref:
Pit2

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
21.13 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.457 %

Result Emulation:
Off

Concentration:
1.2156 %Vol

Span :
1.201

Uniformity:
0.369

Result units:
Volume

Specific Surface Area:
0.0166 m²/g

Surface Weighted Mean D[3,2]:
360.700 um

Vol. Weighted Mean D[4,3]:
434.345 um

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d(0.1): 221.771 um **d(0.5):** 399.777 um **d(0.9):** 701.926 um

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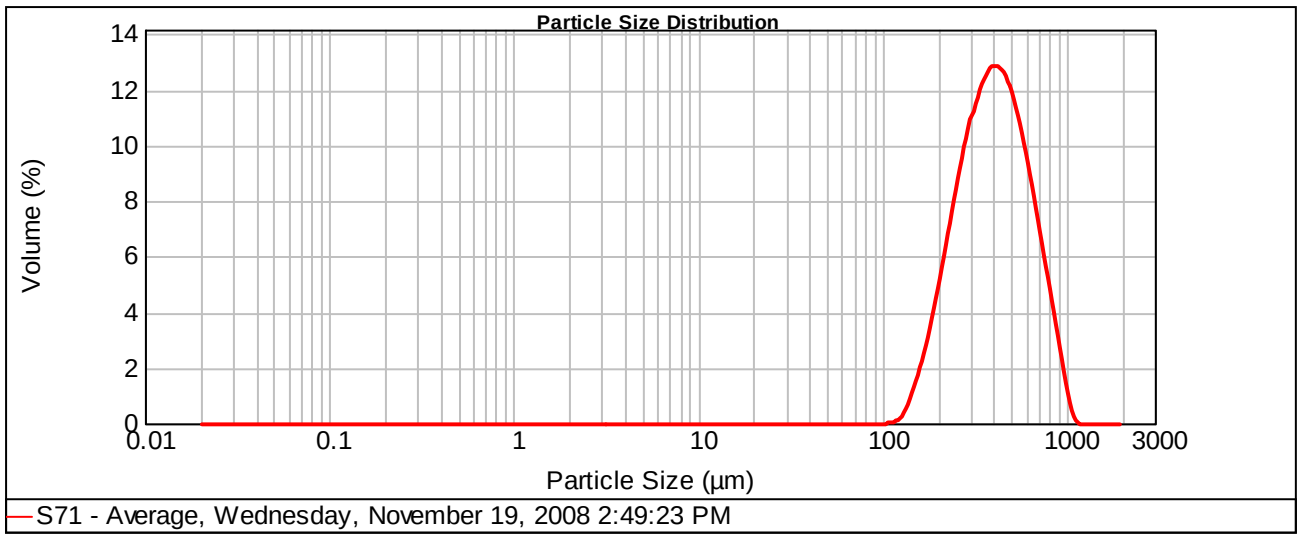


Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.26	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	1.15	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	2.32	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	3.96	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	5.84	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	7.83	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	9.61	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	10.94	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	11.58	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	11.43	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	10.51	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	8.95	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	7.00	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	4.92	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	2.84	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	0.82	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.04	1096.478	0.00		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.04	1258.925	0.00		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S72 - Average

Sample Source & type:
Mamallapuram

Sample bulk lot ref:
Pit2

SOP Name:

Measured by:
student

Result Source:
Averaged

Measured:
Wednesday, November 19, 2008 2:55:23 PM

Analysed:
Wednesday, November 19, 2008 2:55:25 PM

Particle Name:
Default

Particle RI:
1.520

Dispersant Name:
Water

Accessory Name:
Hydro 2000G (A)

Absorption:
0.1

Dispersant RI:
1.330

Analysis model:
General purpose

Size range:
0.020 to 2000.000 um

Weighted Residual:
1.366 %

Sensitivity:
Normal

Obscuration:
19.52 %

Result Emulation:
Off

Concentration:
0.9929 %Vol

Specific Surface Area:
0.0186 m²/g

Span :
1.324

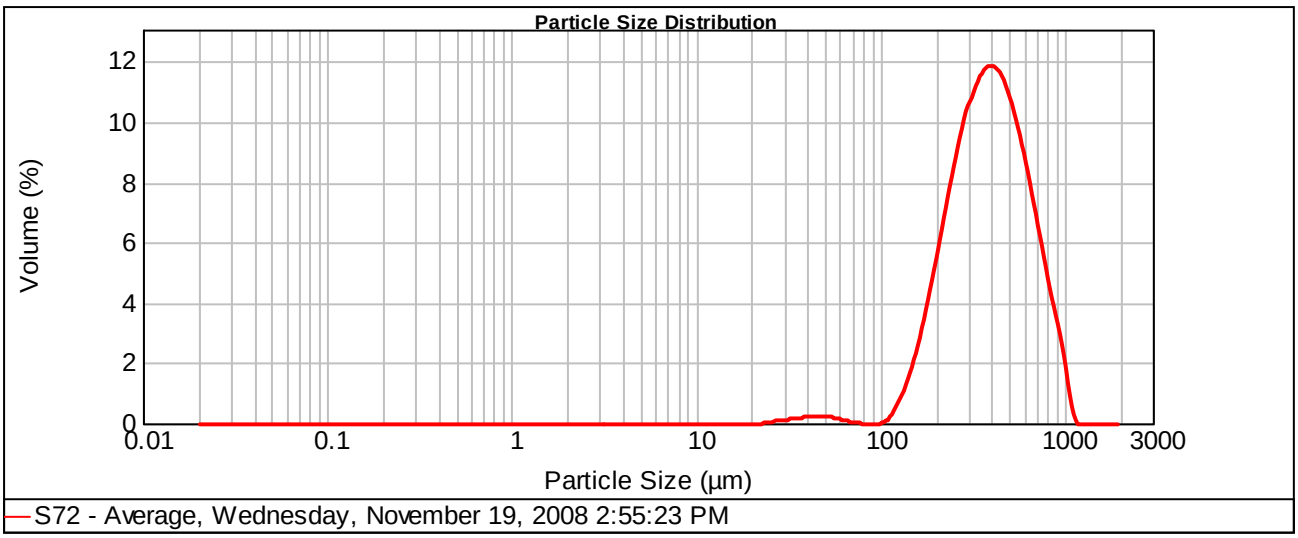
Surface Weighted Mean D[3,2]:
322.605 um

Uniformity:
0.409

Vol. Weighted Mean D[4,3]:
426.759 um

Result units:
Volume

d(0.1): 203.219 um **d(0.5):** 387.875 um **d(0.9):** 716.698 um



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.76	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	1.65	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	2.91	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	4.49	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	6.21	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.02	239.883	7.92	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.09	275.423	9.36	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.13	316.228	10.35	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.17	363.078	10.73	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.20	416.869	10.46	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.20	478.630	9.58	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.16	549.541	8.22	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.08	630.957	6.58	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.01	724.436	4.84	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	3.23	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	1.48	10000.000	
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.17	1096.478	0.00		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S73 - Average

SOP Name:

Measured:
Wednesday, November 19, 2008 3:02:32 PM

Sample Source & type:
Mamallapuram

Measured by:
student

Analysed:
Wednesday, November 19, 2008 3:02:33 PM

Sample bulk lot ref:
Pit3

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
20.07 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.589 %

Result Emulation:
Off

Concentration:
1.1438 %Vol

Span :
1.276

Uniformity:
0.39

Result units:
Volume

Specific Surface Area:
0.0167 m²/g

Surface Weighted Mean D[3,2]:
359.670 um

Vol. Weighted Mean D[4,3]:
442.253 um

d(0.1): 216.767 um **d(0.5):** 403.155 um **d(0.9):** 731.075 um

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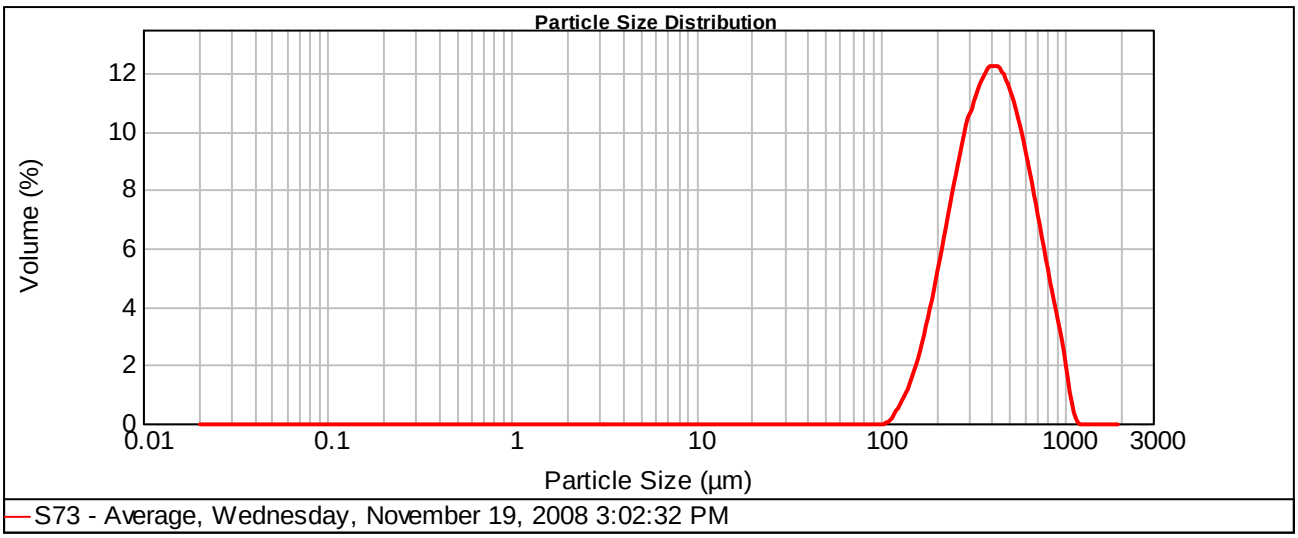


Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.61	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	1.36	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	2.53	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	4.05	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	5.79	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	7.61	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	9.22	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	10.42	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	11.01	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	10.90	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	10.12	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	8.79	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	7.10	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	5.25	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	3.50	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	1.63	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.09	1096.478	0.02		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	0.00		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S74 - Average

SOP Name:

Measured:
Wednesday, November 19, 2008 3:16:51 PM

Sample Source & type:
Mamallapuram

Measured by:
student

Analysed:
Wednesday, November 19, 2008 3:16:52 PM

Sample bulk lot ref:
Pit3

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
19.07 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.805 %

Result Emulation:
Off

Concentration:
1.1174 %Vol

Span :
1.273

Uniformity:
0.395

Result units:
Volume

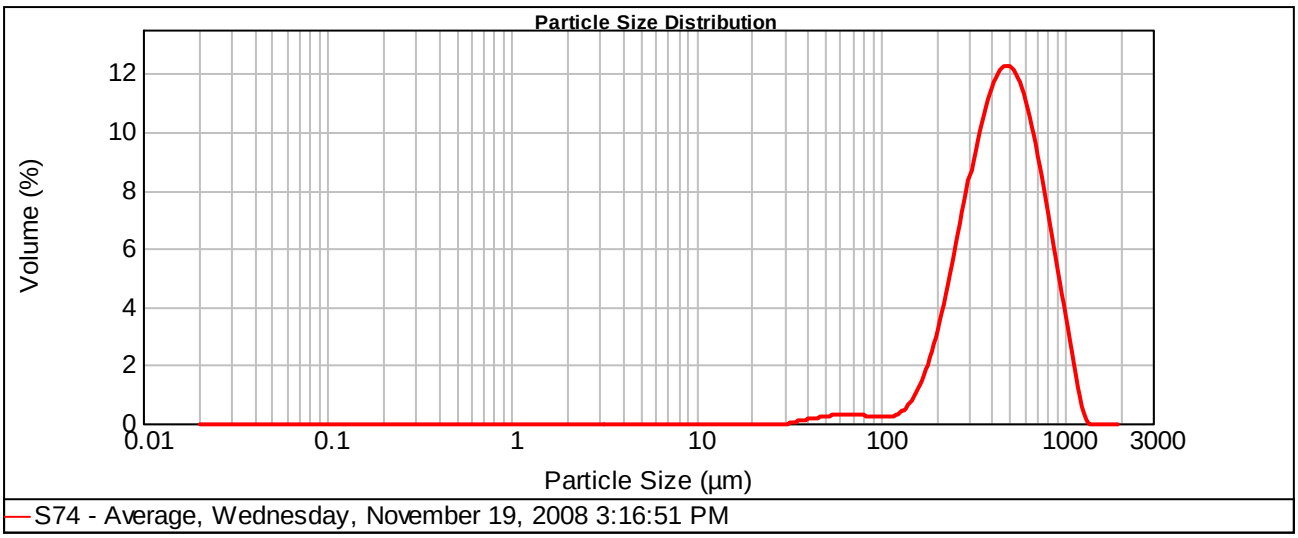
Specific Surface Area:
0.0161 m²/g

Surface Weighted Mean D[3,2]:
372.594 um

Vol. Weighted Mean D[4,3]:
496.671 um

d(0.1): 236.556 um **d(0.5):** 459.511 um **d(0.9):** 821.500 um

---



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.34	1258.925	0.02
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.70	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	1.35	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	2.39	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	3.77	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	5.45	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	7.23	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.01	316.228	8.92	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.10	363.078	10.24	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.15	416.869	10.98	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.21	478.630	11.00	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.25	549.541	10.27	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.28	630.957	8.91	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.27	724.436	7.10	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.23	831.764	5.11	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.19	954.993	3.15	10000.000	
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.20	1096.478	1.17		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S75 - Average

SOP Name:

Measured:
Wednesday, November 19, 2008 3:23:43 PM

Sample Source & type:
Mamallapuram

Measured by:
student

Analysed:
Wednesday, November 19, 2008 3:23:44 PM

Sample bulk lot ref:
Pit4

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
21.40 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.809 %

Result Emulation:
Off

Concentration:
1.0746 %Vol

Span :
1.275

Uniformity:
0.395

Result units:
Volume

Specific Surface Area:
0.0189 m²/g

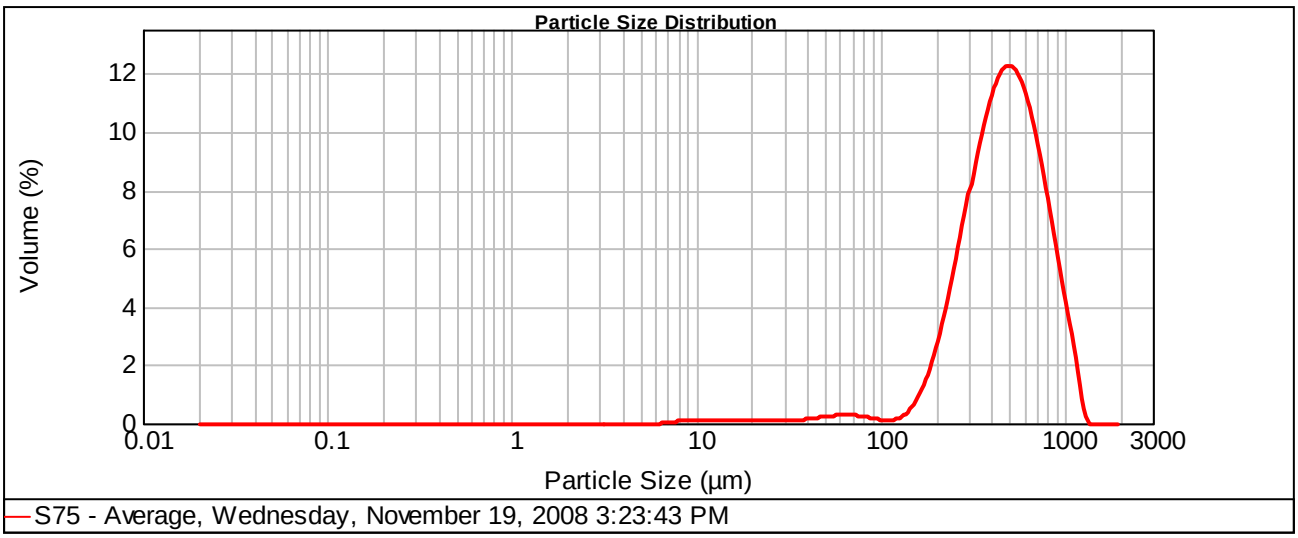
Surface Weighted Mean D[3,2]:
317.122 um

Vol. Weighted Mean D[4,3]:
509.951 um

---

d(0.1): 242.605 um **d(0.5):** 473.156 um **d(0.9):** 845.927 um

---



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.08	120.226	0.19	1258.925	0.03
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.09	138.038	0.49	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.08	158.489	1.08	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.08	181.970	2.04	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.07	208.930	3.37	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.06	239.883	5.02	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.07	275.423	6.81	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.08	316.228	8.56	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.11	363.078	9.99	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.16	416.869	10.89	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.21	478.630	11.07	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.25	549.541	10.49	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.26	630.957	9.24	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.03	69.183	0.24	724.436	7.49	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.07	79.433	0.19	831.764	5.51	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.07	91.201	0.13	954.993	3.59	10000.000	
0.091	0.00	0.955	0.00	10.000	0.08	104.713	0.10	1096.478	1.65		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S76 - Average

SOP Name:

Measured:
Wednesday, November 19, 2008 3:30:08 PM

Sample Source & type:
Mamallapuram

Measured by:
student

Analysed:
Wednesday, November 19, 2008 3:30:10 PM

Sample bulk lot ref:
Pit4

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
22.76 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.775 %

Result Emulation:
Off

Concentration:
1.1053 %Vol

Span :
1.251

Uniformity:
0.389

Result units:
Volume

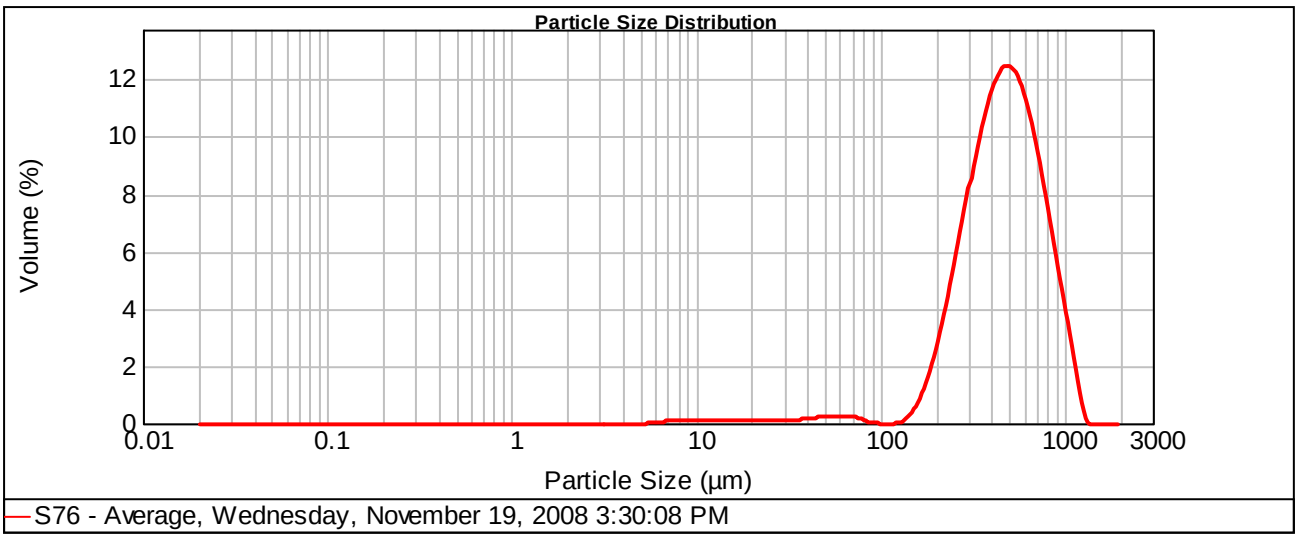
Specific Surface Area:
0.0197 m²/g

Surface Weighted Mean D[3,2]:
304.819 um

Vol. Weighted Mean D[4,3]:
505.422 um

d(0.1): 246.898 um **d(0.5):** 468.410 um **d(0.9):** 833.040 um

---



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.09	120.226	0.03	1258.925	0.02
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.09	138.038	0.32	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.09	158.489	0.98	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.08	181.970	2.03	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.07	208.930	3.47	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.06	239.883	5.23	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.07	275.423	7.11	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.09	316.228	8.91	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.13	363.078	10.32	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.17	416.869	11.14	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.22	478.630	11.21	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.24	549.541	10.50	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.23	630.957	9.14	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.04	69.183	0.19	724.436	7.32	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.07	79.433	0.06	831.764	5.31	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.07	91.201	-0.00	954.993	3.36	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.08	104.713	0.00	1096.478	1.38		
0.105	0.00	1.096	0.00	11.482	0.09	120.226	0.00	1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S77 - Average

SOP Name:

Measured:
Wednesday, November 19, 2008 3:38:14 PM

Sample Source & type:
Mamallapuram

Measured by:
student

Analysed:
Wednesday, November 19, 2008 3:38:15 PM

Sample bulk lot ref:
Pit5

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
24.02 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.610 %

Result Emulation:
Off

Concentration:
0.9392 %Vol

Span :
1.219

Uniformity:
0.384

Result units:
Volume

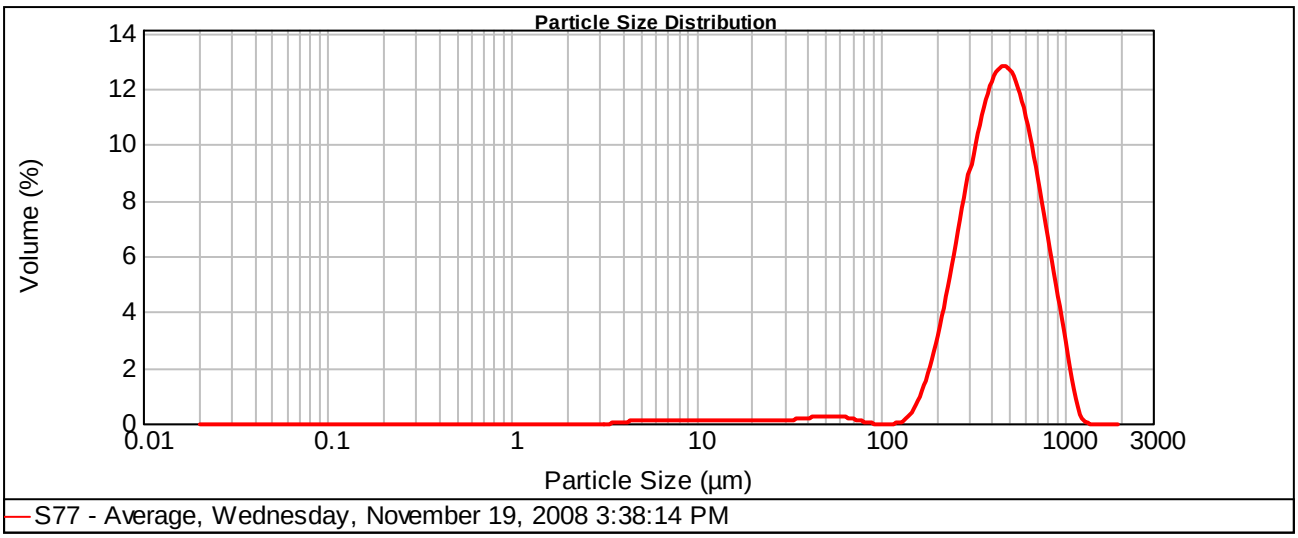
Specific Surface Area:
0.0244 m²/g

Surface Weighted Mean D[3,2]:
245.594 um

Vol. Weighted Mean D[4,3]:
480.133 um

d(0.1): 238.991 um **d(0.5):** 447.671 um **d(0.9):** 784.650 um

---



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.11	120.226	0.03	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.11	138.038	0.34	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.10	158.489	1.07	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.09	181.970	2.24	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.08	208.930	3.81	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.08	239.883	5.73	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.09	275.423	7.73	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.11	316.228	9.57	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.01	34.674	0.15	363.078	10.92	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.05	39.811	0.20	416.869	11.56	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.07	45.709	0.23	478.630	11.35	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.08	52.481	0.24	549.541	10.31	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.08	60.256	0.20	630.957	8.64	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.09	69.183	0.12	724.436	6.60	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.10	79.433	0.02	831.764	4.50	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.11	91.201	0.00	954.993	2.46	10000.000	
0.091	0.00	0.955	0.00	10.000	0.11	104.713	0.00	1096.478	0.52		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S78 - Average

SOP Name:

Measured:
Wednesday, November 19, 2008 3:44:58 PM

Sample Source & type:
Mamallapuram

Measured by:
student

Analysed:
Wednesday, November 19, 2008 3:45:00 PM

Sample bulk lot ref:
Pit5

Result Source:
Edited

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
21.39 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.530 %

Result Emulation:
Off

Concentration:
1.1531 %Vol

Span :
1.245

Uniformity:
0.386

Result units:
Volume

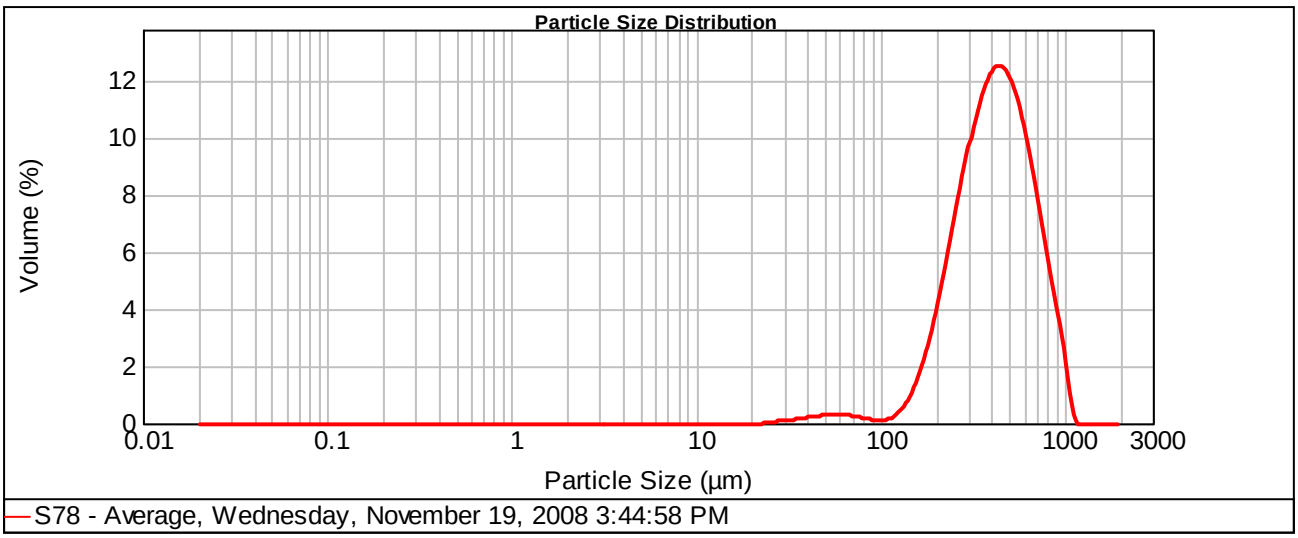
Specific Surface Area:
0.0177 m²/g

Surface Weighted Mean D[3,2]:
338.236 um

Vol. Weighted Mean D[4,3]:
452.463 um

d(0.1): 220.248 um **d(0.5):** 420.006 um **d(0.9):** 743.213 um

---



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.40	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.95	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	1.86	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	3.18	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	4.82	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.02	239.883	6.67	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.08	275.423	8.48	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.11	316.228	10.03	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.16	363.078	11.02	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.21	416.869	11.29	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.26	478.630	10.78	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.29	549.541	9.54	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.27	630.957	7.78	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.21	724.436	5.74	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.14	831.764	3.79	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.09	954.993	1.69	10000.000	
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.15	1096.478	0.00		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S79 - Average

SOP Name:

Measured:
Wednesday, November 19, 2008 3:53:31 PM

Sample Source & type:
Mamallapuram

Measured by:
student

Analysed:
Wednesday, November 19, 2008 3:53:33 PM

Sample bulk lot ref:
Pit6

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
21.94 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.819 %

Result Emulation:
Off

Concentration:
1.4567 %Vol

Span :
1.117

Uniformity:
0.345

Result units:
Volume

Specific Surface Area:
0.0145 m²/g

Surface Weighted Mean D[3,2]:
414.184 um

Vol. Weighted Mean D[4,3]:
486.568 um

---

d(0.1): 261.830 um **d(0.5):** 451.998 um **d(0.9):** 766.664 um

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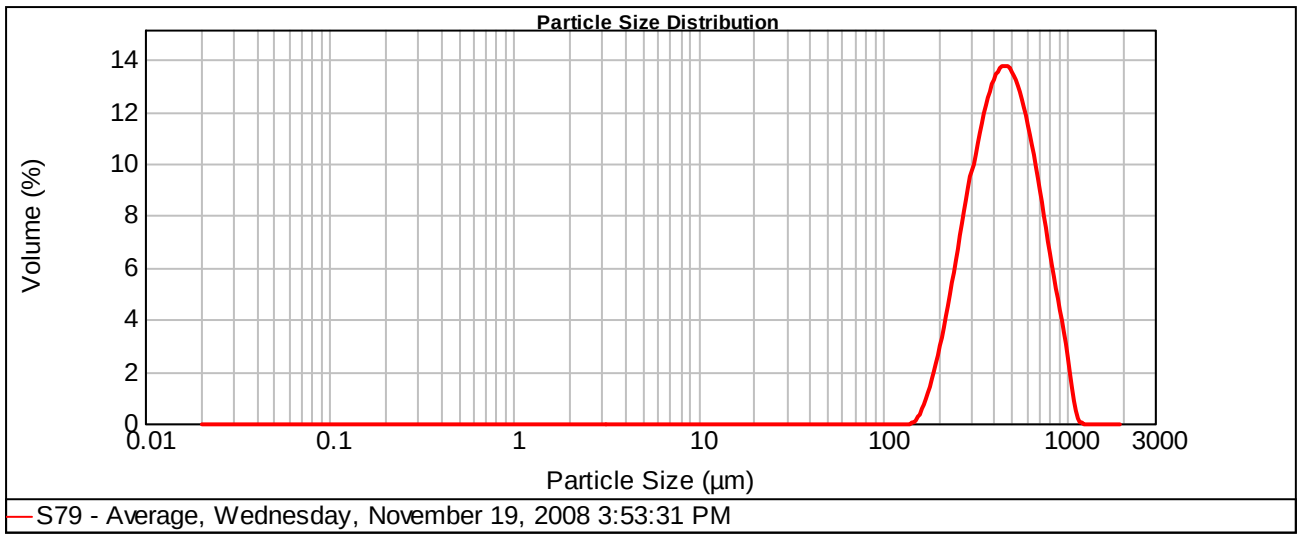


Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.04	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	0.70	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	1.98	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	3.77	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	5.95	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	8.23	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	10.30	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	11.78	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	12.42	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	12.09	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	10.84	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	8.91	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	6.58	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	4.31	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	2.07	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	0.05		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	0.00		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S80 - Average

Sample Source & type:
Mamallapuram

Sample bulk lot ref:
Pit6

SOP Name:

Measured by:
student

Result Source:
Averaged

Measured:
Wednesday, November 19, 2008 3:59:28 PM

Analysed:
Wednesday, November 19, 2008 3:59:30 PM

Particle Name:
Default

Particle RI:
1.520

Dispersant Name:
Water

Accessory Name:
Hydro 2000G (A)

Absorption:
0.1

Dispersant RI:
1.330

Analysis model:
General purpose

Size range:
0.020 to 2000.000 um

Weighted Residual:
1.567 %

Sensitivity:
Normal

Obscuration:
20.06 %

Result Emulation:
Off

Concentration:
1.1597 %Vol

Span :
1.196

Uniformity:
0.366

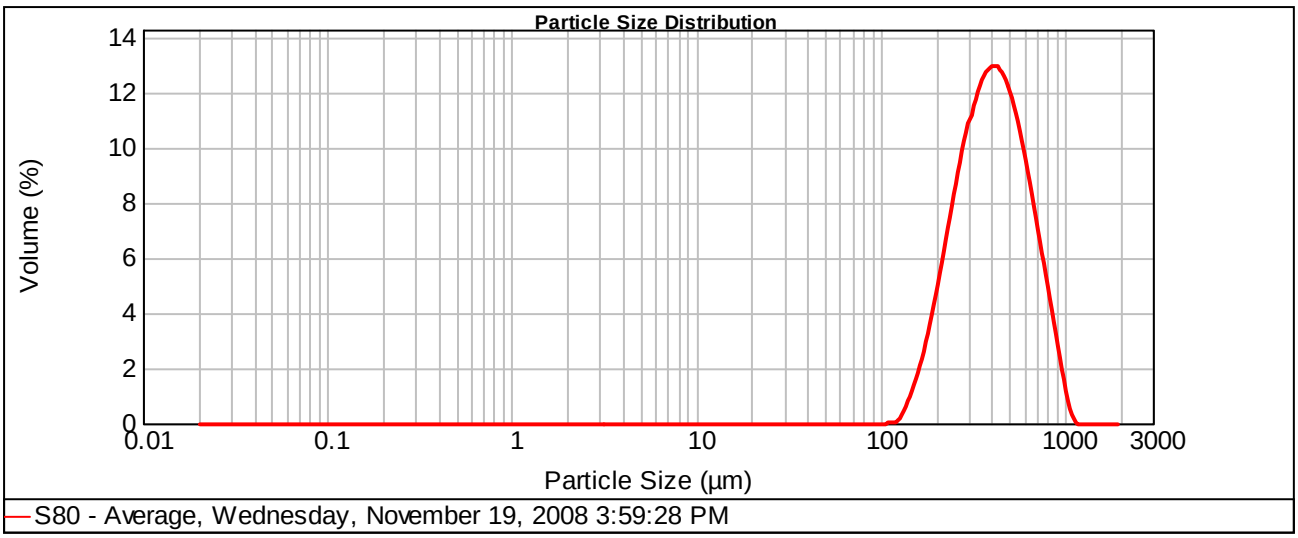
Result units:
Volume

Specific Surface Area:
0.0164 m²/g

Surface Weighted Mean D[3,2]:
364.794 um

Vol. Weighted Mean D[4,3]:
438.276 um

d(0.1): 224.911 um **d(0.5):** 403.375 um **d(0.9):** 707.168 um



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.19	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	1.03	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	2.17	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	3.80	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	5.70	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	7.73	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	9.56	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	10.95	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	11.64	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	11.52	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	10.61	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	9.06	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	7.10	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	5.03	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	2.96	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	0.92	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.01	1096.478	0.00		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.01	1258.925	0.00		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S81 - Average

SOP Name:

Measured:
Wednesday, November 19, 2008 4:06:19 PM

Sample Source & type:
Mamallapuram

Measured by:
student

Analysed:
Wednesday, November 19, 2008 4:06:20 PM

Sample bulk lot ref:
OldDune

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
19.19 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.481 %

Result Emulation:
Off

Concentration:
1.0427 %Vol

Span :
1.188

Uniformity:
0.365

Result units:
Volume

Specific Surface Area:
0.0174 m²/g

Surface Weighted Mean D[3,2]:
345.123 um

Vol. Weighted Mean D[4,3]:
437.400 um

d(0.1): 220.202 um **d(0.5):** 408.056 um **d(0.9):** 704.859 um

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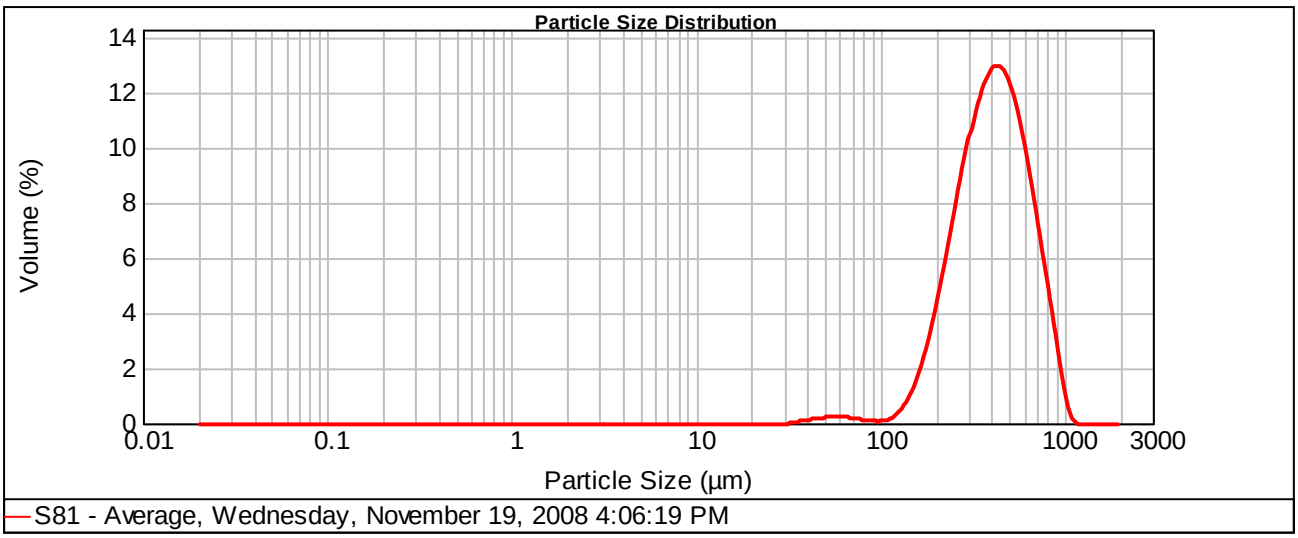

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.43	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	1.04	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	2.02	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	3.44	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	5.19	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	7.16	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	9.05	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.01	316.228	10.62	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.08	363.078	11.56	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.14	416.869	11.69	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.19	478.630	10.95	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.22	549.541	9.44	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.21	630.957	7.39	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.16	724.436	5.14	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.10	831.764	2.87	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.06	954.993	0.70	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.14	1096.478	0.00		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.14	1258.925	0.00		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S82 - Average

SOP Name:

Measured:
Wednesday, November 19, 2008 4:12:48 PM

Sample Source & type:
Mamallapuram

Measured by:
student

Analysed:
Wednesday, November 19, 2008 4:12:49 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
20.33 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.957 %

Result Emulation:
Off

Concentration:
1.4534 %Vol

Span :
1.168

Uniformity:
0.36

Result units:
Volume

Specific Surface Area:
0.0133 m²/g

Surface Weighted Mean D[3,2]:
450.378 um

Vol. Weighted Mean D[4,3]:
537.554 um

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d(0.1): 279.511 um **d(0.5):** 497.298 um **d(0.9):** 860.254 um

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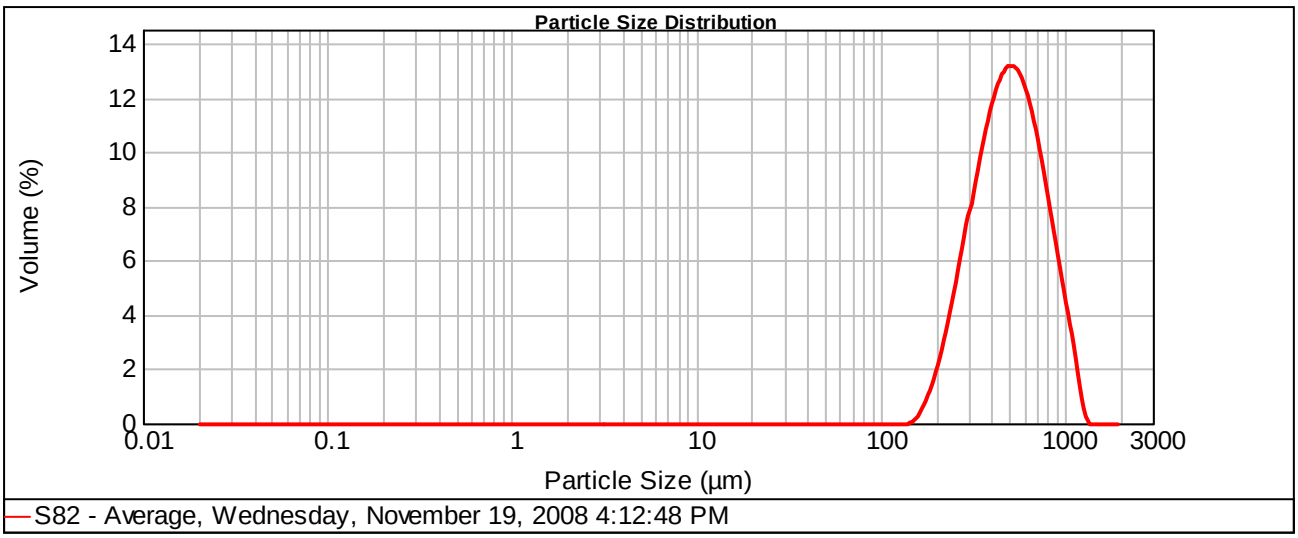

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	0.03
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.03	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	0.51	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	1.44	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	2.81	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	4.61	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	6.63	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	8.68	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	10.41	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	11.58	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	11.94	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	11.42	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	10.10	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	8.19	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	6.01	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	3.89	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	1.74		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	0.03		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S83 - Average

SOP Name:

Measured:
Wednesday, November 19, 2008 4:18:46 PM

Sample Source & type:
Mamallapuram

Measured by:
student

Analysed:
Wednesday, November 19, 2008 4:18:47 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
17.42 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.472 %

Result Emulation:
Off

Concentration:
1.0359 %Vol

Span :
1.204

Uniformity:
0.37

Result units:
Volume

Specific Surface Area:
0.0157 m²/g

Surface Weighted Mean D[3,2]:
381.247 um

Vol. Weighted Mean D[4,3]:
459.408 um

d(0.1): 233.905 um **d(0.5):** 423.232 um **d(0.9):** 743.375 um

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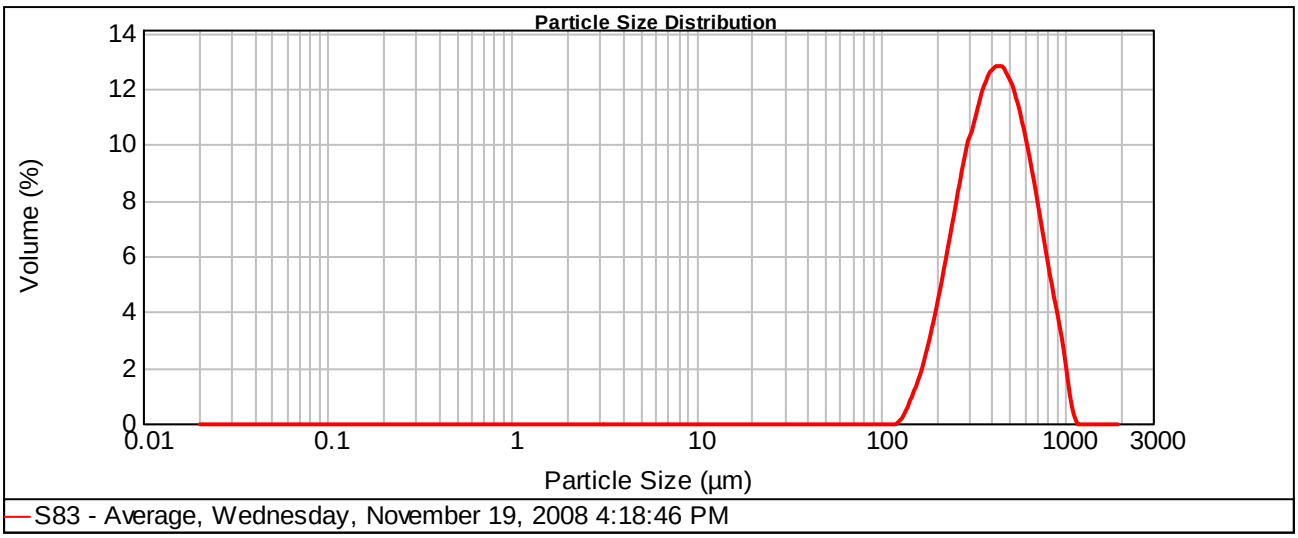

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.08	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.84	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	1.82	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	3.28	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	5.04	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	7.00	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	8.87	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	10.42	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	11.37	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	11.57	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	10.97	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	9.65	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	7.84	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	5.78	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	3.79	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	1.67	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	0.00		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	0.00		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S84 - Average

SOP Name:

Measured:
Wednesday, November 19, 2008 4:25:44 PM

Sample Source & type:
Mamallapuram

Measured by:
student

Analysed:
Wednesday, November 19, 2008 4:25:45 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
21.37 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.495 %

Result Emulation:
Off

Concentration:
1.2613 %Vol

Span :
1.260

Uniformity:
0.386

Result units:
Volume

Specific Surface Area:
0.0162 m²/g

Surface Weighted Mean D[3,2]:
369.316 um

Vol. Weighted Mean D[4,3]:
453.500 um

d(0.1): 222.196 um **d(0.5):** 415.637 um **d(0.9):** 745.800 um

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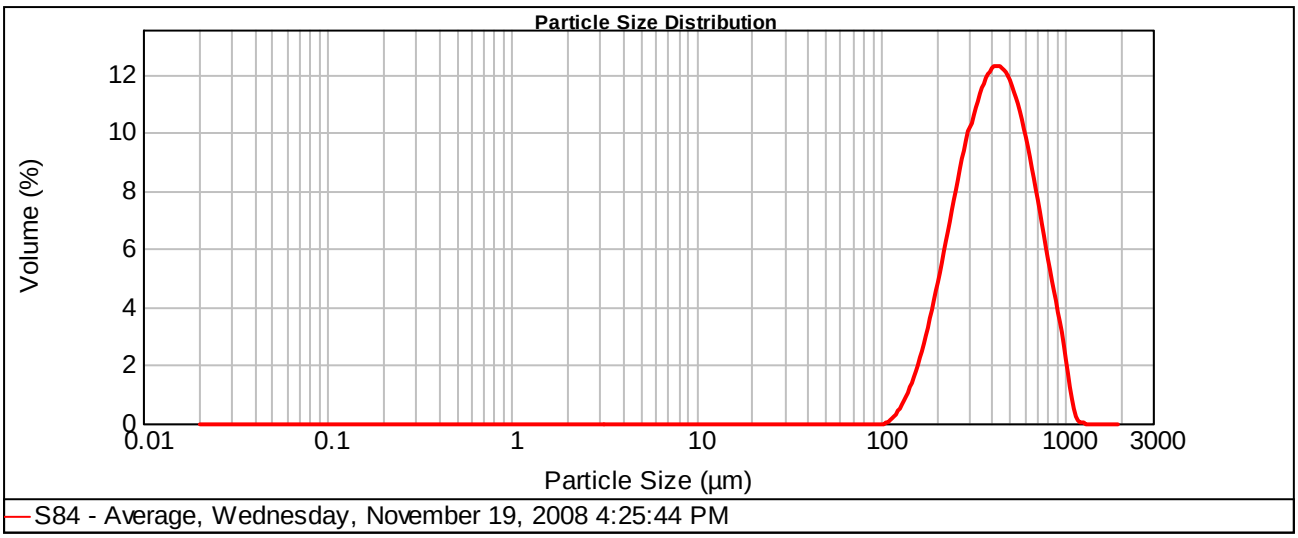


Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.51	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	1.22	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	2.30	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	3.73	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	5.38	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	7.15	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	8.81	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	10.14	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	10.94	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	11.07	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	10.49	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	9.27	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	7.59	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	5.66	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	3.79	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	1.81	10000.000	
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.06	1096.478	0.09		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S85 - Average

SOP Name:

Measured:
Wednesday, November 19, 2008 4:31:56 PM

Sample Source & type:
Mamallapuram

Measured by:
student

Analysed:
Wednesday, November 19, 2008 4:31:58 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
19.65 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.610 %

Result Emulation:
Off

Concentration:
1.2164 %Vol

Span :
1.215

Uniformity:
0.375

Result units:
Volume

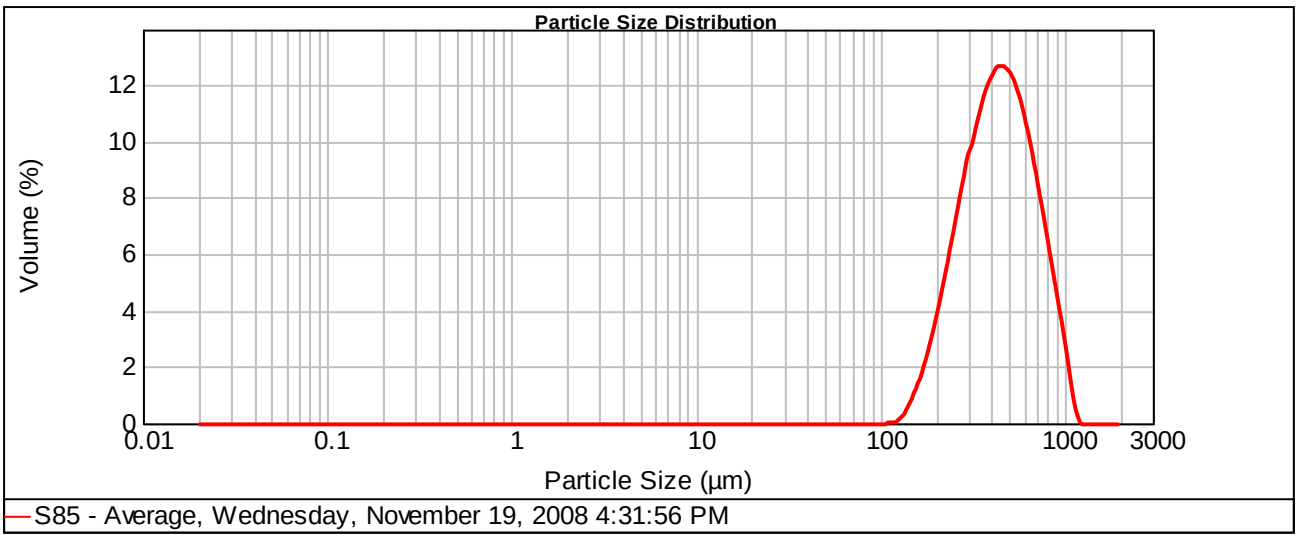
Specific Surface Area:
0.0153 m²/g

Surface Weighted Mean D[3,2]:
391.637 um

Vol. Weighted Mean D[4,3]:
474.799 um

d(0.1): 238.551 um **d(0.5):** 437.881 um **d(0.9):** 770.735 um

---



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.14	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.79	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	1.67	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	2.99	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	4.62	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	6.47	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	8.31	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	9.92	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	11.02	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	11.45	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	11.11	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	10.02	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	8.37	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	6.37	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	4.32	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	2.24	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.01	1096.478	0.19		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.01	1258.925	0.19		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S86 - Average

SOP Name:

Measured:
Wednesday, November 19, 2008 4:39:11 PM

Sample Source & type:
Mamallapuram

Measured by:
student

Analysed:
Wednesday, November 19, 2008 4:39:12 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
18.33 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.501 %

Result Emulation:
Off

Concentration:
1.1031 %Vol

Span :
1.211

Uniformity:
0.373

Result units:
Volume

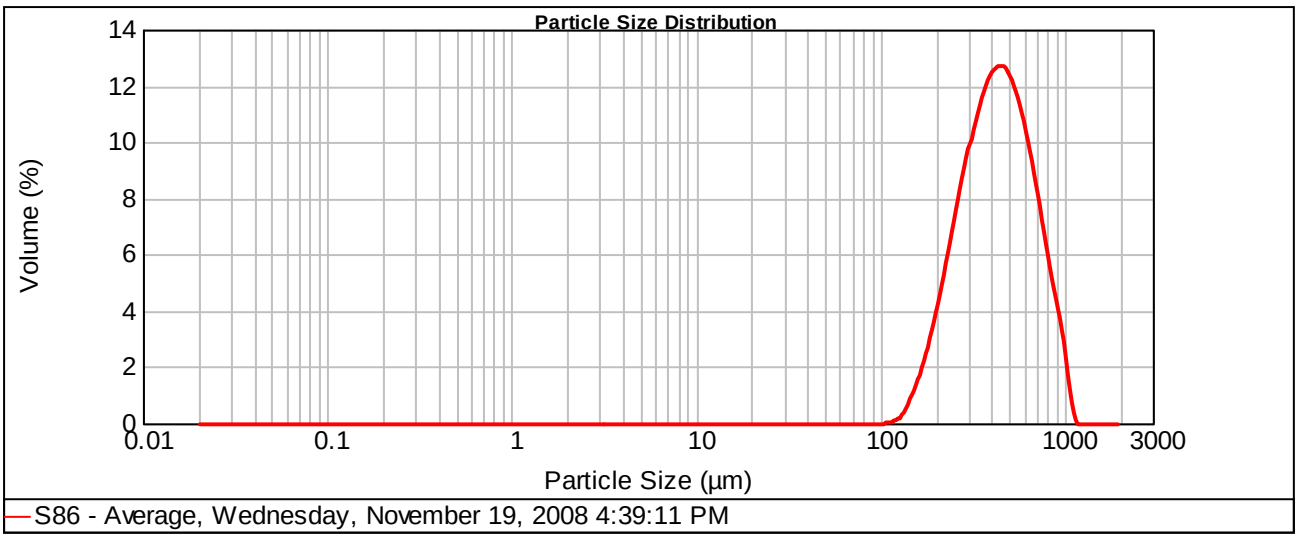
Specific Surface Area:
0.0156 m²/g

Surface Weighted Mean D[3,2]:
383.605 um

Vol. Weighted Mean D[4,3]:
464.520 um

d(0.1): 234.071 um **d(0.5):** 428.733 um **d(0.9):** 753.053 um

---



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.20	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.88	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	1.82	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	3.20	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	4.87	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	6.75	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	8.58	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	10.15	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	11.18	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	11.50	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	11.04	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	9.83	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	8.07	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	5.98	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	4.01	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	1.91	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.03	1096.478	0.00		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.03	1258.925	0.00		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S87 - Average

SOP Name:

Measured:
Wednesday, November 19, 2008 4:46:15 PM

Sample Source & type:
Mamallapuram

Measured by:
student

Analysed:
Wednesday, November 19, 2008 4:46:16 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
16.72 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.737 %

Result Emulation:
Off

Concentration:
1.0835 %Vol

Span :
1.186

Uniformity:
0.365

Result units:
Volume

Specific Surface Area:
0.0144 m²/g

Surface Weighted Mean D[3,2]:
417.088 um

Vol. Weighted Mean D[4,3]:
501.344 um

d(0.1): 256.802 um **d(0.5):** 463.281 um **d(0.9):** 806.412 um

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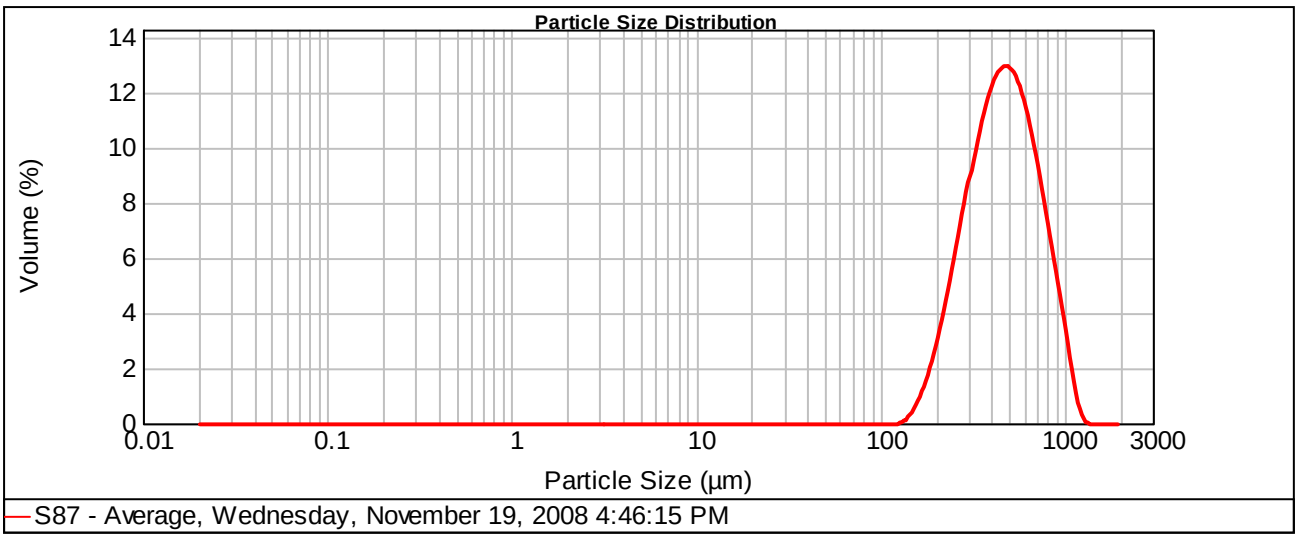


Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.02	1258.925	0.01
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.35	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	1.08	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	2.23	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	3.77	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	5.65	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	7.62	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	9.48	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	10.90	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	11.66	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	11.61	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	10.72	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	9.15	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	7.15	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	5.01	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	2.86	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	0.72		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	0.00		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S88 - Average

SOP Name:

Measured:
Wednesday, November 19, 2008 4:53:41 PM

Sample Source & type:
Mamallapuram

Measured by:
student

Analysed:
Wednesday, November 19, 2008 4:53:42 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
19.62 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.980 %

Result Emulation:
Off

Concentration:
1.4369 %Vol

Span :
1.235

Uniformity:
0.382

Result units:
Volume

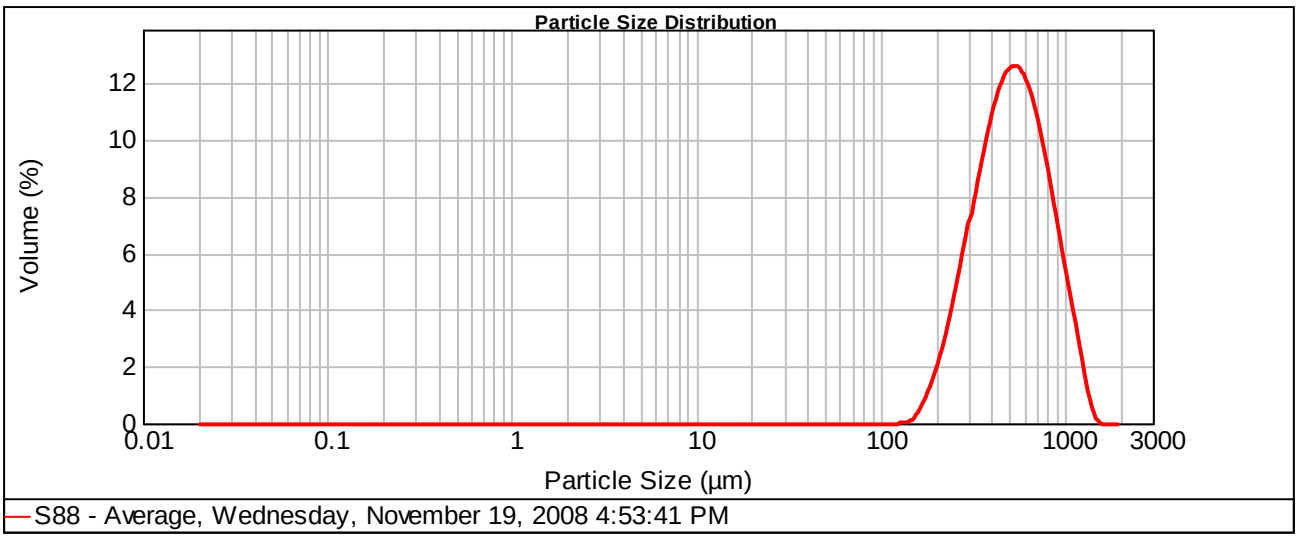
Specific Surface Area:
0.0129 m²/g

Surface Weighted Mean D[3,2]:
463.348 um

Vol. Weighted Mean D[4,3]:
564.566 um

---

d(0.1): 281.796 um **d(0.5):** 517.641 um **d(0.9):** 921.163 um



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.01	1258.925	0.93
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.10	1445.440	0.02
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	0.65	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	1.46	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	2.67	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	4.25	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	6.06	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	7.94	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	9.61	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	10.83	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	11.38	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	11.16	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	10.18	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	8.60	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	6.66	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	4.68	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	2.82		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S89 - Average

SOP Name:

Measured:
Wednesday, November 19, 2008 5:01:21 PM

Sample Source & type:
Mamallapuram

Measured by:
student

Analysed:
Wednesday, November 19, 2008 5:01:23 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
16.20 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.733 %

Result Emulation:
Off

Concentration:
1.0461 %Vol

Span :
1.238

Uniformity:
0.379

Result units:
Volume

Specific Surface Area:
0.0144 m²/g

Surface Weighted Mean D[3,2]:
416.909 um

Vol. Weighted Mean D[4,3]:
508.749 um

d(0.1): 252.643 um **d(0.5):** 467.248 um **d(0.9):** 830.951 um

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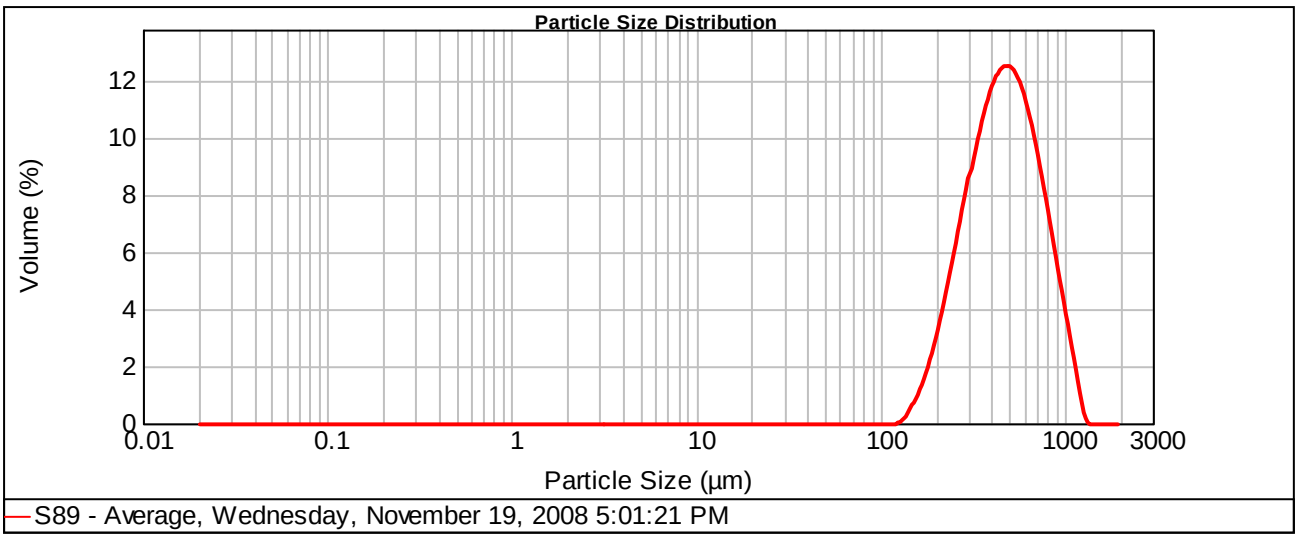

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.05	1258.925	0.02
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.54	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	1.26	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	2.40	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	3.86	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	5.61	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	7.43	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	9.14	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	10.47	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	11.21	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	11.22	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	10.48	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	9.10	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	7.27	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	5.27	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	3.32	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	1.35		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	0.00		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S90 - Average

SOP Name:

Measured:
Wednesday, November 19, 2008 5:07:55 PM

Sample Source & type:
Mamallapuram

Measured by:
student

Analysed:
Wednesday, November 19, 2008 5:07:57 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
20.87 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.739 %

Result Emulation:
Off

Concentration:
1.3875 %Vol

Span :
1.241

Uniformity:
0.38

Result units:
Volume

Specific Surface Area:
0.0144 m²/g

Surface Weighted Mean D[3,2]:
417.502 um

Vol. Weighted Mean D[4,3]:
510.325 um

d(0.1): 252.612 um **d(0.5):** 468.726 um **d(0.9):** 834.418 um

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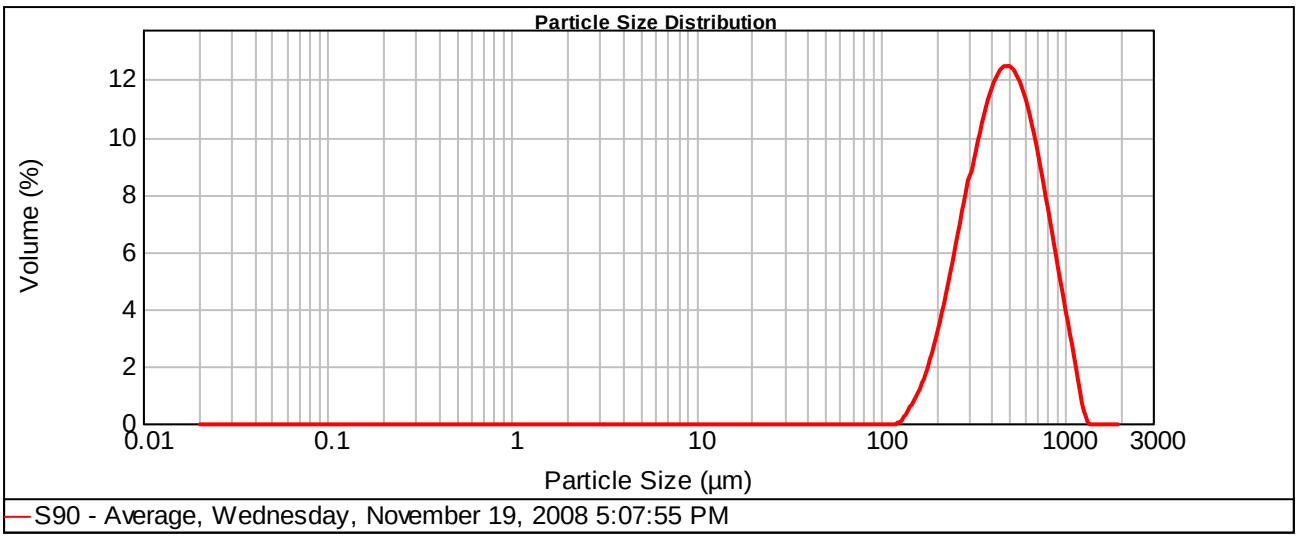

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.06	1258.925	0.02
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.59	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	1.28	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	2.39	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	3.82	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	5.55	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	7.36	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	9.08	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	10.41	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	11.17	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	11.21	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	10.49	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	9.13	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	7.32	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	5.32	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	3.38	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	1.42		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S91 - Average

SOP Name:

Measured:
Wednesday, November 19, 2008 5:13:48 PM

Sample Source & type:
Mamallapuram

Measured by:
student

Analysed:
Wednesday, November 19, 2008 5:13:50 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
18.50 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.942 %

Result Emulation:
Off

Concentration:
1.3096 %Vol

Span :
1.210

Uniformity:
0.373

Result units:
Volume

Specific Surface Area:
0.0133 m²/g

Surface Weighted Mean D[3,2]:
450.877 um

Vol. Weighted Mean D[4,3]:
544.737 um

d(0.1): 276.177 um **d(0.5):** 501.211 um **d(0.9):** 882.795 um

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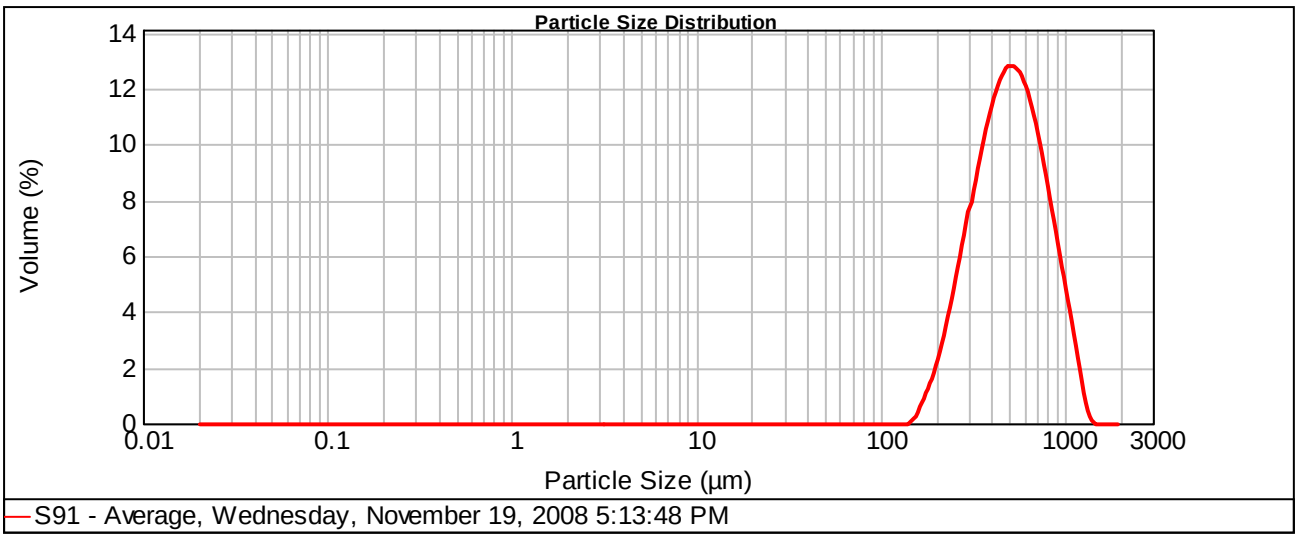

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	0.32
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.05	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	0.72	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	1.59	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	2.92	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	4.61	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	6.51	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	8.44	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	10.09	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	11.21	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	11.59	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	11.16	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	9.97	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	8.23	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	6.20	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	4.20	10000.000	
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	2.19		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S92 - Average

SOP Name:

Measured:
Wednesday, November 19, 2008 5:21:19 PM

Sample Source & type:
Mamallapuram

Measured by:
student

Analysed:
Wednesday, November 19, 2008 5:21:21 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
19.87 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
2.093 %

Result Emulation:
Off

Concentration:
1.5123 %Vol

Span :
1.246

Uniformity:
0.383

Result units:
Volume

Specific Surface Area:
0.0125 m²/g

Surface Weighted Mean D[3,2]:
480.576 um

Vol. Weighted Mean D[4,3]:
586.111 um

d(0.1): 292.186 um **d(0.5):** 535.818 um **d(0.9):** 959.793 um

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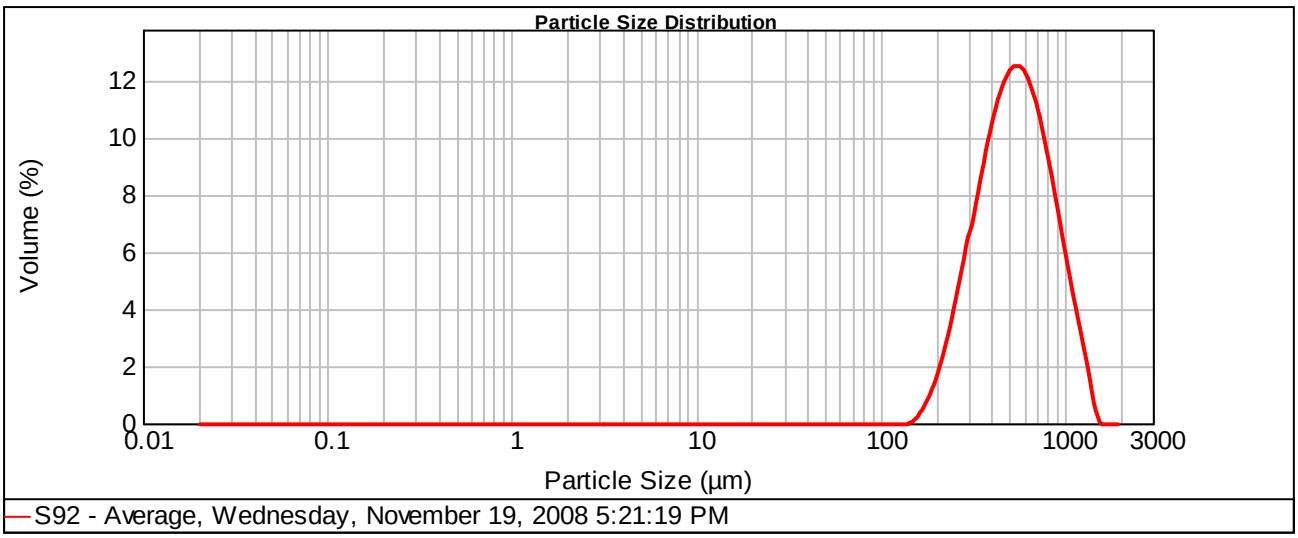

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	1.63
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.03	1445.440	0.05
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	0.45	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	1.19	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	2.32	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	3.84	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	5.62	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	7.52	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	9.25	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	10.58	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	11.28	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	11.22	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	10.40	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	8.96	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	7.11	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	5.17	10000.000	
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	3.37		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S93 - Average

SOP Name:

Measured:
Wednesday, November 19, 2008 5:27:29 PM

Sample Source & type:
Mamallapuram

Measured by:
student

Analysed:
Wednesday, November 19, 2008 5:27:30 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
16.67 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.876 %

Result Emulation:
Off

Concentration:
1.1567 %Vol

Span :
1.234

Uniformity:
0.38

Result units:
Volume

Specific Surface Area:
0.0134 m²/g

Surface Weighted Mean D[3,2]:
446.643 um

Vol. Weighted Mean D[4,3]:
544.129 um

d(0.1): 271.563 um **d(0.5):** 499.633 um **d(0.9):** 888.202 um

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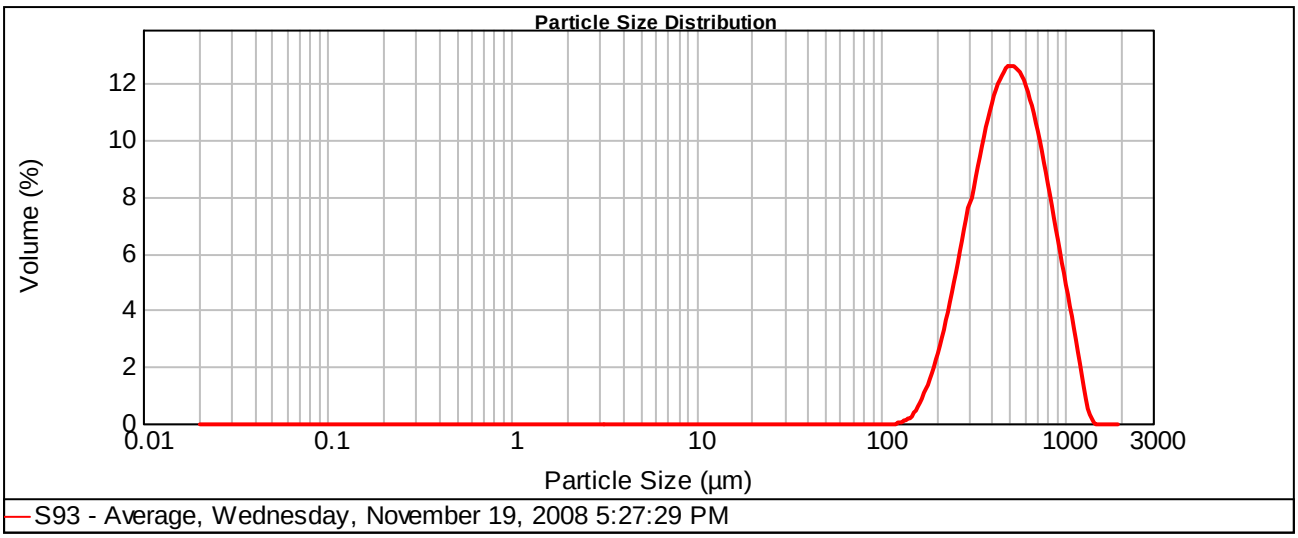


Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.03	1258.925	0.38
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.22	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	0.83	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	1.74	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	3.04	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	4.70	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	6.53	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	8.38	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	9.96	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	11.02	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	11.39	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	10.97	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	9.83	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	8.15	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	6.20	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	4.28	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	2.34		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	0.00		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S94 - Average

SOP Name:

Measured:
Wednesday, November 19, 2008 5:34:34 PM

Sample Source & type:
Mamallapuram

Measured by:
student

Analysed:
Wednesday, November 19, 2008 5:34:35 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
16.61 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.695 %

Result Emulation:
Off

Concentration:
1.0768 %Vol

Span :
1.239

Uniformity:
0.379

Result units:
Volume

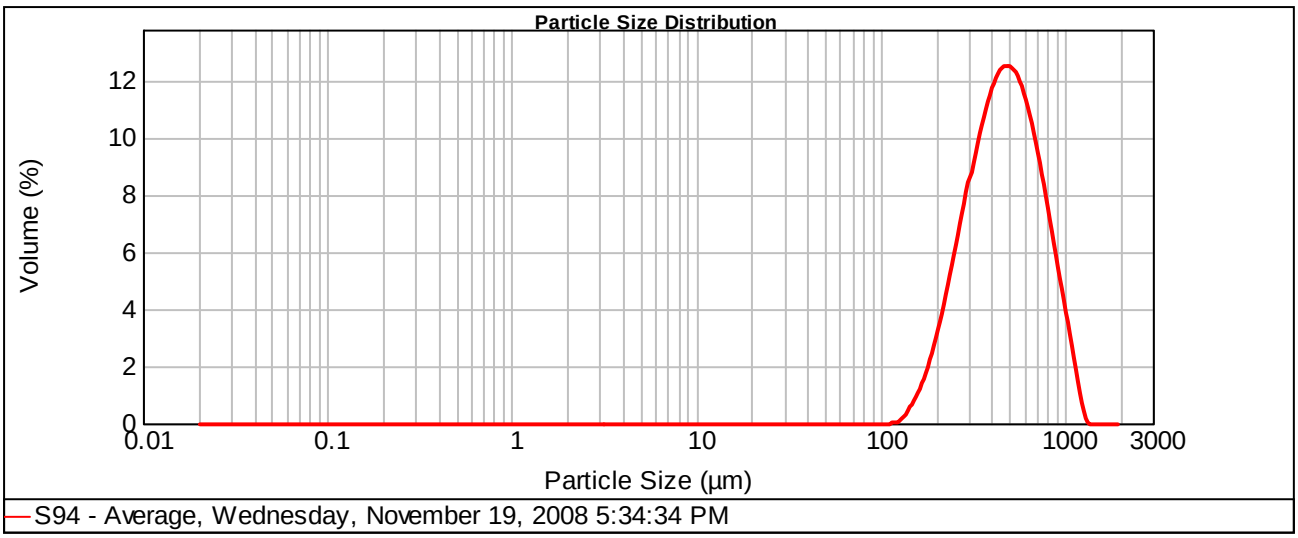
Specific Surface Area:
0.0144 m²/g

Surface Weighted Mean D[3,2]:
417.452 um

Vol. Weighted Mean D[4,3]:
510.328 um

---

d(0.1): 252.515 um **d(0.5):** 469.230 um **d(0.9):** 833.722 um



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.09	1258.925	0.02
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.59	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	1.28	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	2.39	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	3.81	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	5.52	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	7.33	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	9.04	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	10.39	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	11.18	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	11.23	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	10.53	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	9.17	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	7.35	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	5.34	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	3.37	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	1.38		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S95 - Average

SOP Name:

Measured:
Wednesday, November 19, 2008 5:40:32 PM

Sample Source & type:
Mamallapuram

Measured by:
student

Analysed:
Wednesday, November 19, 2008 5:40:33 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
19.48 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
2.084 %

Result Emulation:
Off

Concentration:
1.4704 %Vol

Span :
1.176

Uniformity:
0.363

Result units:
Volume

Specific Surface Area:
0.0126 m²/g

Surface Weighted Mean D[3,2]:
477.754 um

Vol. Weighted Mean D[4,3]:
571.903 um

d(0.1): 295.741 um **d(0.5):** 528.514 um **d(0.9):** 917.233 um

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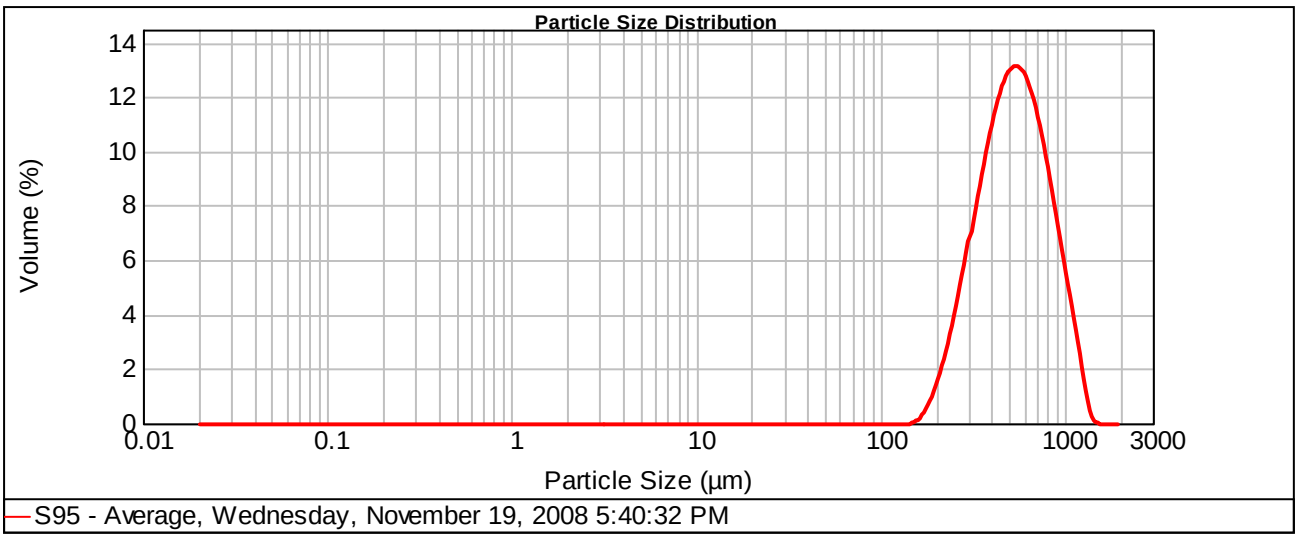


Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	0.59
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.01	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	0.29	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	1.03	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	2.19	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	3.80	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	5.71	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	7.77	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	9.65	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	11.10	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	11.83	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	11.70	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	10.72	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	9.05	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	6.98	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	4.84	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	2.76		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S96 - Average

SOP Name:

Measured:
Wednesday, November 19, 2008 5:46:11 PM

Sample Source & type:
Mamallapuram

Measured by:
student

Analysed:
Wednesday, November 19, 2008 5:46:13 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
20.95 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.787 %

Result Emulation:
Off

Concentration:
1.4518 %Vol

Span :
1.280

Uniformity:
0.394

Result units:
Volume

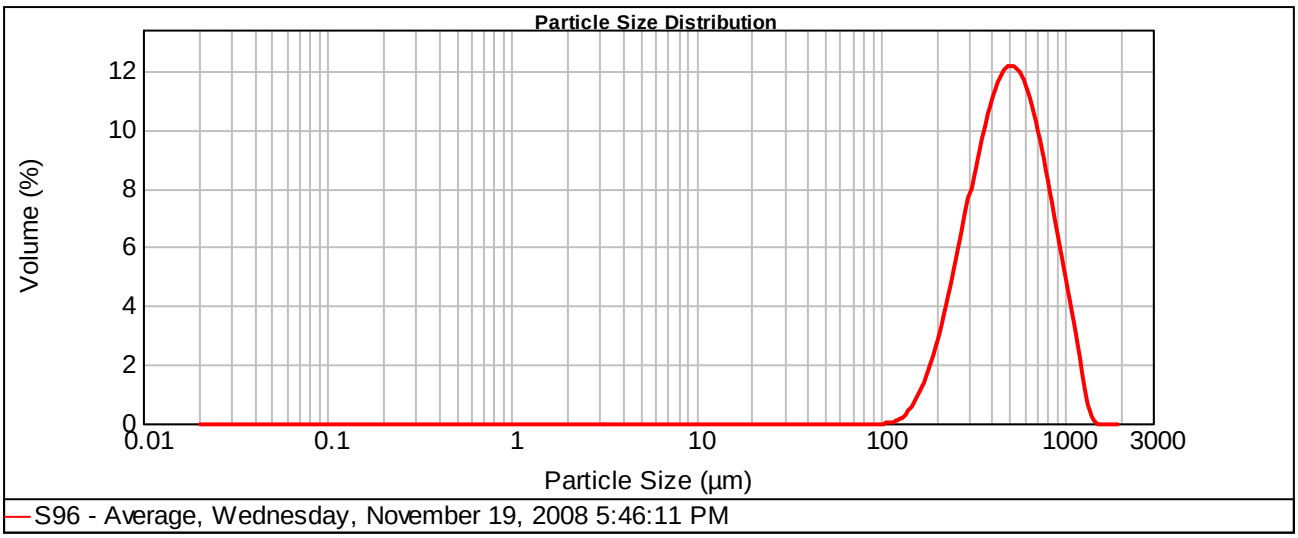
Specific Surface Area:
0.0138 m²/g

Surface Weighted Mean D[3,2]:
434.975 um

Vol. Weighted Mean D[4,3]:
538.810 um

d(0.1): 260.193 um **d(0.5):** 492.920 um **d(0.9):** 891.082 um

---



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.13	1258.925	0.49
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.52	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	1.13	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	2.10	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	3.38	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	4.95	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	6.65	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	8.34	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	9.74	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	10.69	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	10.99	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	10.59	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	9.52	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	7.95	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	6.11	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	4.27	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.02	1096.478	2.42		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.02	1258.925	2.42		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S97 - Average

SOP Name:

Measured:
Wednesday, November 19, 2008 5:51:25 PM

Sample Source & type:
Mamallapuram

Measured by:
student

Analysed:
Wednesday, November 19, 2008 5:51:27 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
18.12 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.231 %

Result Emulation:
Off

Concentration:
0.7207 %Vol

Span :
1.437

Uniformity:
0.447

Result units:
Volume

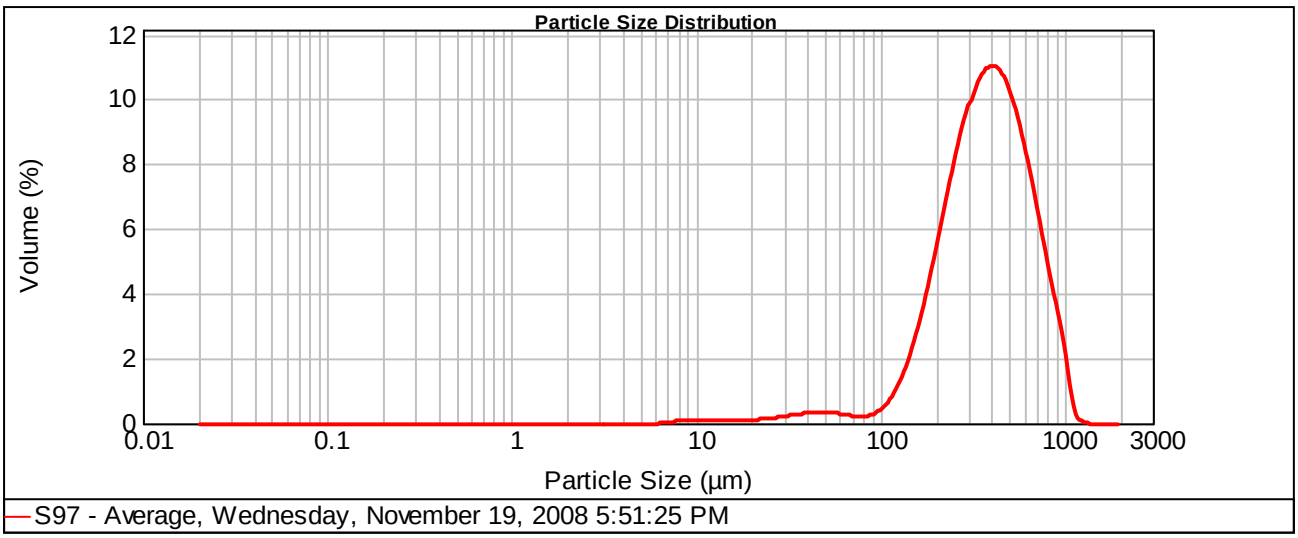
Specific Surface Area:
0.0234 m²/g

Surface Weighted Mean D[3,2]:
256.031 um

Vol. Weighted Mean D[4,3]:
418.491 um

d(0.1): 179.331 um **d(0.5):** 380.413 um **d(0.9):** 725.892 um

---



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.07	120.226	1.20	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.07	138.038	2.05	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.07	158.489	3.16	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.08	181.970	4.53	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.10	208.930	6.00	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.13	239.883	7.46	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.18	275.423	8.70	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.23	316.228	9.58	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.27	363.078	9.97	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.30	416.869	9.80	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.31	478.630	9.09	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.29	549.541	7.93	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.24	630.957	6.48	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.20	724.436	4.87	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.03	79.433	0.22	831.764	3.35	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.06	91.201	0.34	954.993	1.71	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.06	104.713	0.65	1096.478	0.15		
0.105	0.00	1.096	0.00	11.482	0.07	120.226	0.65	1258.925	0.15		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S98 - Average

SOP Name:

Measured:
Wednesday, November 19, 2008 6:00:36 PM

Sample Source & type:
Mamallapuram

Measured by:
student

Analysed:
Wednesday, November 19, 2008 6:00:38 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
20.90 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.159 %

Result Emulation:
Off

Concentration:
0.6996 %Vol

Span :
1.455

Uniformity:
0.452

Result units:
Volume

Specific Surface Area:
0.0281 m²/g

Surface Weighted Mean D[3,2]:
213.484 um

Vol. Weighted Mean D[4,3]:
396.467 um

d(0.1): 169.481 um **d(0.5):** 359.236 um **d(0.9):** 692.141 um

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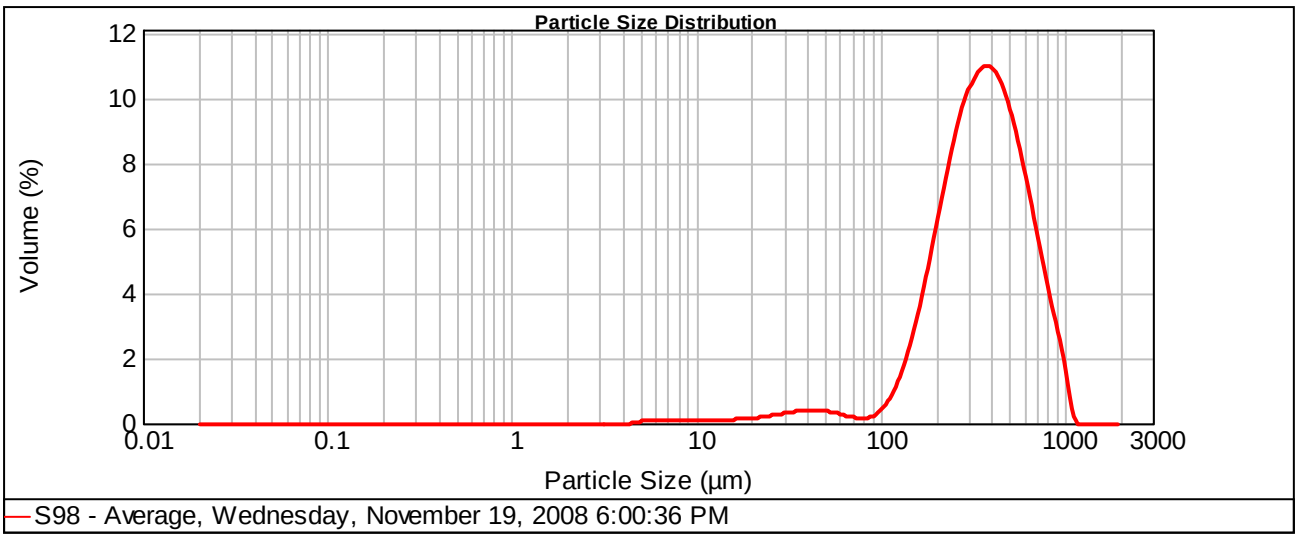

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.10	120.226	1.34	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.10	138.038	2.33	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.11	158.489	3.59	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.13	181.970	5.09	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.16	208.930	6.62	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.20	239.883	8.05	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.25	275.423	9.16	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.31	316.228	9.83	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.35	363.078	9.94	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.37	416.869	9.49	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.35	478.630	8.55	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.02	52.481	0.30	549.541	7.24	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.07	60.256	0.22	630.957	5.75	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.07	69.183	0.15	724.436	4.20	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.08	79.433	0.16	831.764	2.80	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.09	91.201	0.30	954.993	1.27	10000.000	
0.091	0.00	0.955	0.00	10.000	0.09	104.713	0.68	1096.478	0.00		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S99 - Average

SOP Name:

Measured:
Wednesday, November 19, 2008 6:07:01 PM

Sample Source & type:
Mamallapuram

Measured by:
student

Analysed:
Wednesday, November 19, 2008 6:07:03 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
20.95 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.221 %

Result Emulation:
Off

Concentration:
0.8108 %Vol

Span :
1.451

Uniformity:
0.452

Result units:
Volume

Specific Surface Area:
0.0244 m²/g

Surface Weighted Mean D[3,2]:
245.977 um

Vol. Weighted Mean D[4,3]:
433.931 um

d(0.1): 187.960 um **d(0.5):** 391.478 um **d(0.9):** 755.884 um

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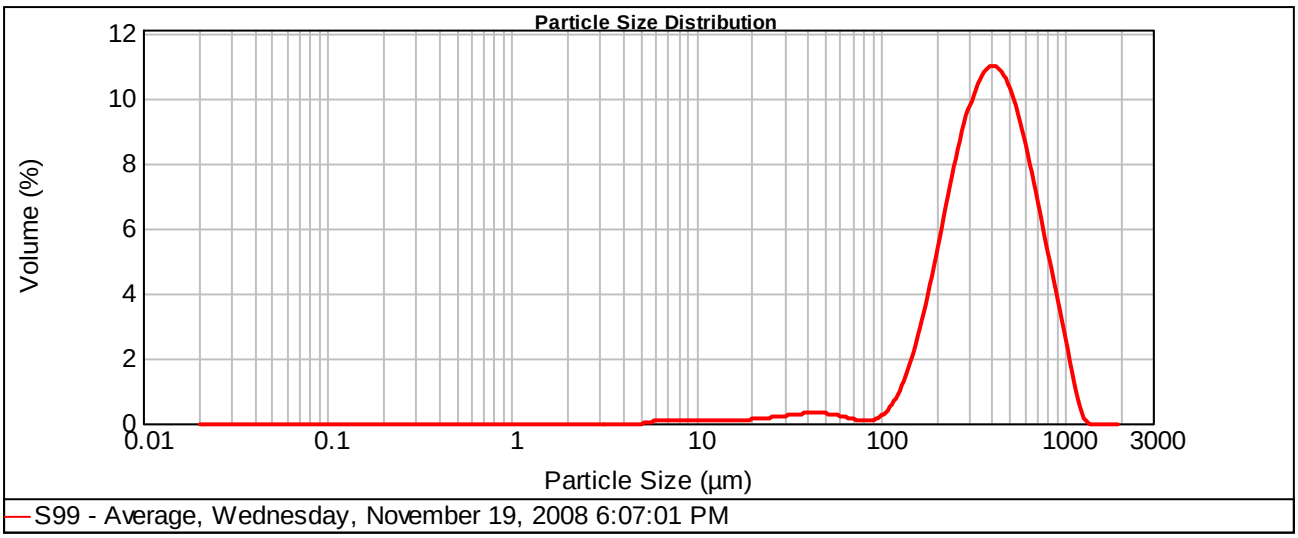

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.08	120.226	0.95	1258.925	0.01
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.09	138.038	1.79	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.09	158.489	2.91	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.10	181.970	4.29	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.12	208.930	5.80	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.15	239.883	7.30	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.19	275.423	8.58	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.23	316.228	9.51	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.27	363.078	9.93	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.29	416.869	9.81	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.28	478.630	9.16	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.24	549.541	8.07	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.02	60.256	0.17	630.957	6.68	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.07	69.183	0.10	724.436	5.17	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.07	79.433	0.07	831.764	3.69	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.08	91.201	0.16	954.993	2.19	10000.000	
0.091	0.00	0.955	0.00	10.000	0.08	104.713	0.43	1096.478	0.69		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S100 - Average

SOP Name:

Measured:
Wednesday, November 19, 2008 6:13:07 PM

Sample Source & type:
Mamallapuram

Measured by:
student

Analysed:
Wednesday, November 19, 2008 6:13:09 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
20.52 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.308 %

Result Emulation:
Off

Concentration:
0.5224 %Vol

Span :
1.434

Uniformity:
0.449

Result units:
Volume

Specific Surface Area:
0.0361 m²/g

Surface Weighted Mean D[3,2]:
166.173 um

Vol. Weighted Mean D[4,3]:
430.939 um

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d(0.1): 183.199 um **d(0.5):** 394.654 um **d(0.9):** 748.949 um

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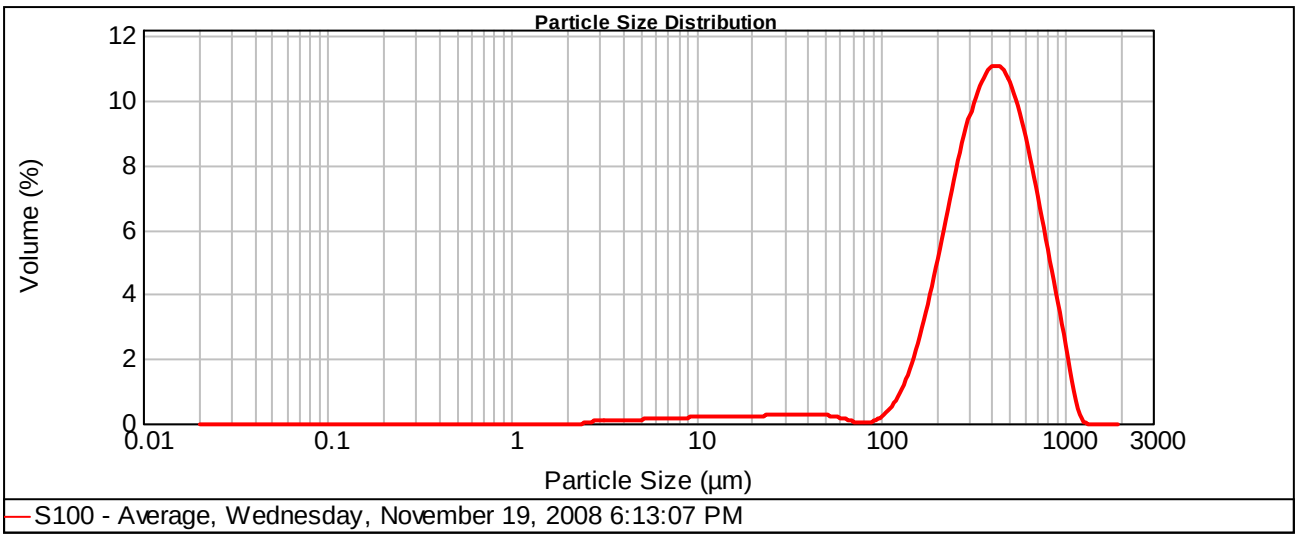

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.18	120.226	0.88	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.19	138.038	1.65	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.19	158.489	2.70	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.20	181.970	4.03	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.21	208.930	5.49	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.22	239.883	6.99	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.24	275.423	8.33	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.05	30.200	0.26	316.228	9.37	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.07	34.674	0.27	363.078	9.93	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.08	39.811	0.27	416.869	9.94	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.09	45.709	0.24	478.630	9.39	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.10	52.481	0.19	549.541	8.34	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.12	60.256	0.13	630.957	6.92	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.13	69.183	0.13	724.436	5.31	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.14	79.433	0.02	831.764	3.69	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.16	91.201	0.01	954.993	2.04	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.17	104.713	0.12	1096.478	0.40		
0.105	0.00	1.096	0.00	11.482	0.18	120.226	0.39	1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S101 - Average

SOP Name:

Measured:
Wednesday, November 19, 2008 6:18:37 PM

Sample Source & type:
Mamallapuram

Measured by:
student

Analysed:
Wednesday, November 19, 2008 6:18:38 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
21.69 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.490 %

Result Emulation:
Off

Concentration:
1.2271 %Vol

Span :
1.442

Uniformity:
0.446

Result units:
Volume

Specific Surface Area:
0.0169 m²/g

Surface Weighted Mean D[3,2]:
354.186 um

Vol. Weighted Mean D[4,3]:
490.395 um

d(0.1): 214.557 um **d(0.5):** 440.281 um **d(0.9):** 849.235 um

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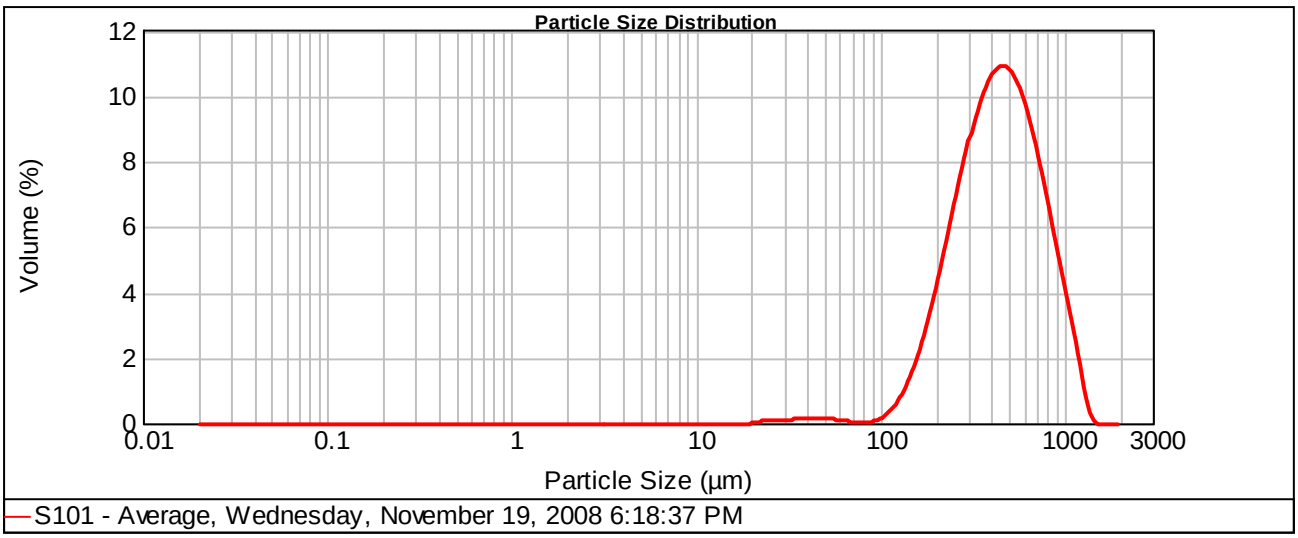


Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.73	1258.925	0.40
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	1.39	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	2.29	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	3.46	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.03	208.930	4.79	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.07	239.883	6.23	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.08	275.423	7.59	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.10	316.228	8.75	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.12	363.078	9.55	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.13	416.869	9.89	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.13	478.630	9.71	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.11	549.541	9.02	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.08	630.957	7.91	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.01	724.436	6.52	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.01	831.764	4.99	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.11	954.993	3.49	10000.000	
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.33	1096.478	1.98		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S102 - Average

SOP Name:

Measured:
Wednesday, November 19, 2008 6:23:50 PM

Sample Source & type:
Mamallapuram

Measured by:
student

Analysed:
Wednesday, November 19, 2008 6:23:51 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
28.35 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.707 %

Result Emulation:
Off

Concentration:
1.9313 %Vol

Span :
1.366

Uniformity:
0.418

Result units:
Volume

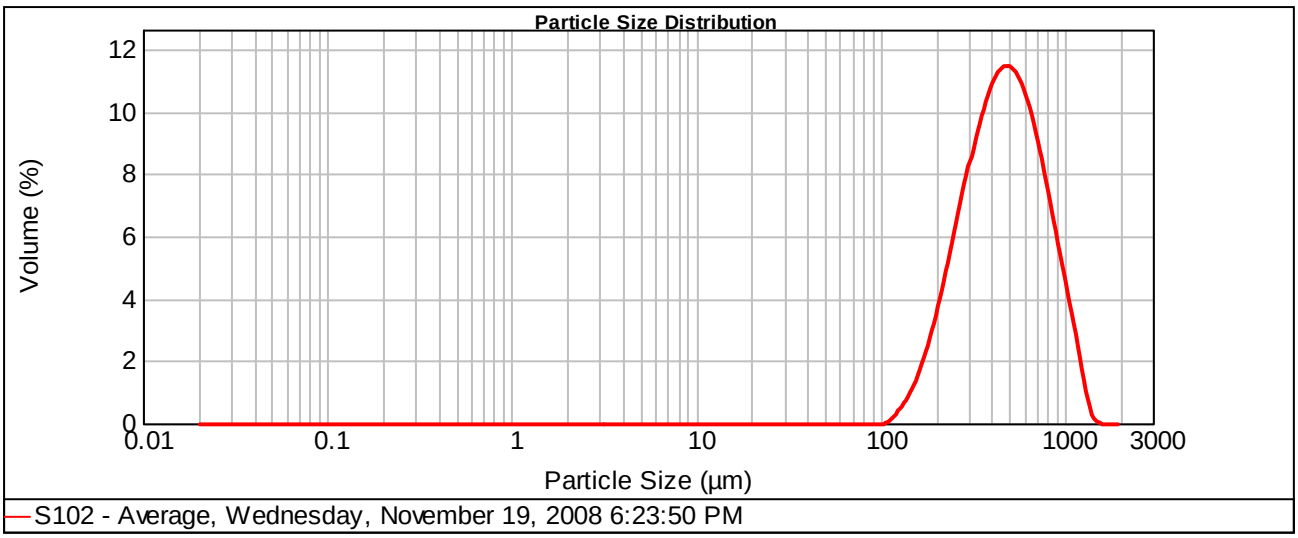
Specific Surface Area:
0.0147 m²/g

Surface Weighted Mean D[3,2]:
407.949 um

Vol. Weighted Mean D[4,3]:
518.027 um

d(0.1): 238.310 um **d(0.5):** 467.973 um **d(0.9):** 877.548 um

---



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.45	1258.925	0.59
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.95	1445.440	0.01
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	1.75	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	2.84	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	4.18	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	5.69	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	7.21	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	8.61	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	9.68	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	10.28	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	10.31	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	9.75	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	8.68	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	7.21	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	5.55	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	3.92	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.07	1096.478	2.28		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.07	1258.925	2.28		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S104 - Average

SOP Name:

Measured:
Wednesday, April 08, 2009 11:29:49 AM

Sample Source & type:
Vadanemelli

Measured by:
JohnstonP

Analysed:
Wednesday, April 08, 2009 11:29:51 AM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
18.21 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.855 %

Result Emulation:
Off

Concentration:
1.2872 %Vol

Span :
1.585

Uniformity:
0.488

Result units:
Volume

Specific Surface Area:
0.0133 m²/g

Surface Weighted Mean D[3,2]:
451.517 um

Vol. Weighted Mean D[4,3]:
656.179 um

---

d(0.1): 253.446 um **d(0.5):** 582.716 um **d(0.9):** 1176.772 um

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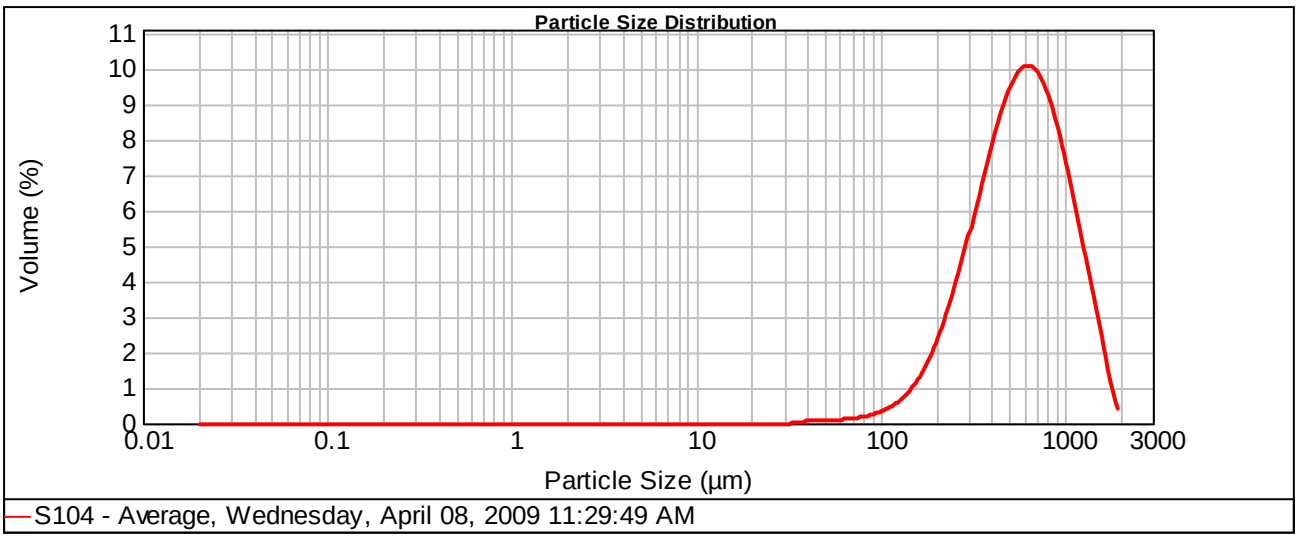

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.60	1258.925	3.87
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.89	1445.440	2.53
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	1.31	1659.587	1.06
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	1.88	1905.461	0.16
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	2.63	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	3.56	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	4.62	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	5.78	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.05	363.078	6.91	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.06	416.869	7.92	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.07	478.630	8.67	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.09	549.541	9.07	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.11	630.957	9.04	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.14	724.436	8.58	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.19	831.764	7.72	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.28	954.993	6.56	10000.000	
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.40	1096.478	5.23		
0.105	0.00	1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S105 - Average

SOP Name:

Measured:
Wednesday, April 08, 2009 11:40:17 AM

Sample Source & type:
Vadanemelli

Measured by:
JohnstonP

Analysed:
Wednesday, April 08, 2009 11:40:18 AM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
17.03 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.739 %

Result Emulation:
Off

Concentration:
1.1923 %Vol

Span :
1.294

Uniformity:
0.399

Result units:
Volume

Specific Surface Area:
0.0133 m²/g

Surface Weighted Mean D[3,2]:
449.798 um

Vol. Weighted Mean D[4,3]:
555.223 um

d(0.1): 270.644 um **d(0.5):** 503.698 um **d(0.9):** 922.289 um

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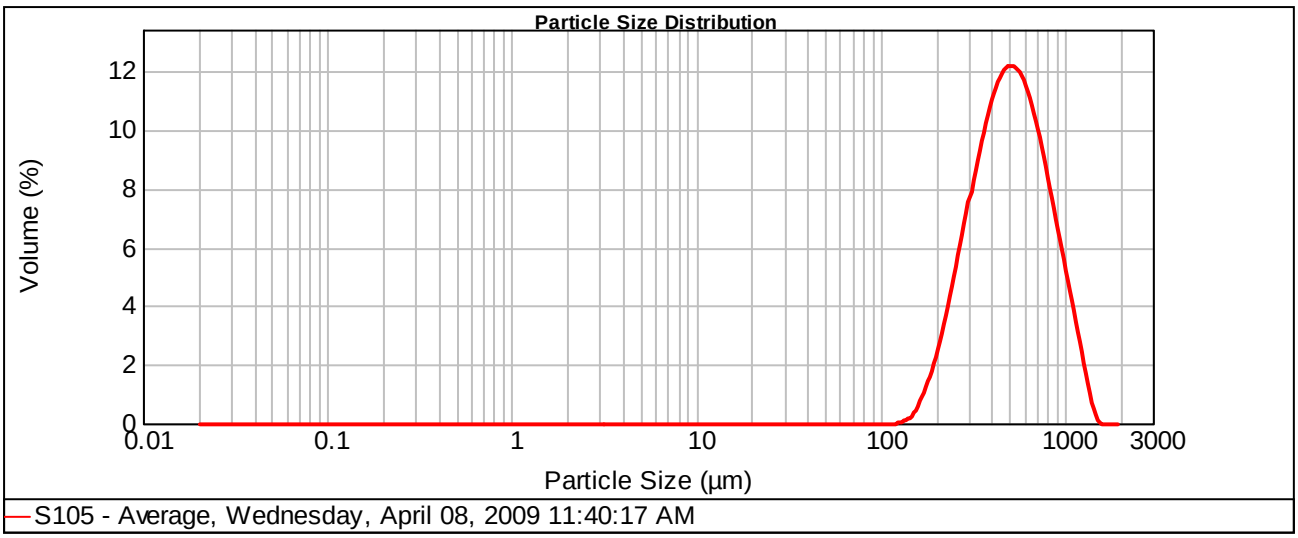

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.03	1258.925	1.12
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.22	1445.440	0.03
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	0.85	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	1.78	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	3.09	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	4.73	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	6.51	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	8.28	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	9.74	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	10.70	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	11.01	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	10.60	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	9.56	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	8.04	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	6.29	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	4.58	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	2.85		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	0.00		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S106 - Average

SOP Name:

Measured:
Wednesday, April 08, 2009 11:48:28 AM

Sample Source & type:
Vadanemelli

Measured by:
JohnstonP

Analysed:
Wednesday, April 08, 2009 11:48:30 AM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
16.83 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
2.005 %

Result Emulation:
Off

Concentration:
1.2236 %Vol

Span :
1.274

Uniformity:
0.393

Result units:
Volume

Specific Surface Area:
0.0128 m²/g

Surface Weighted Mean D[3,2]:
467.455 um

Vol. Weighted Mean D[4,3]:
576.653 um

d(0.1): 281.384 um **d(0.5):** 526.363 um **d(0.9):** 951.728 um

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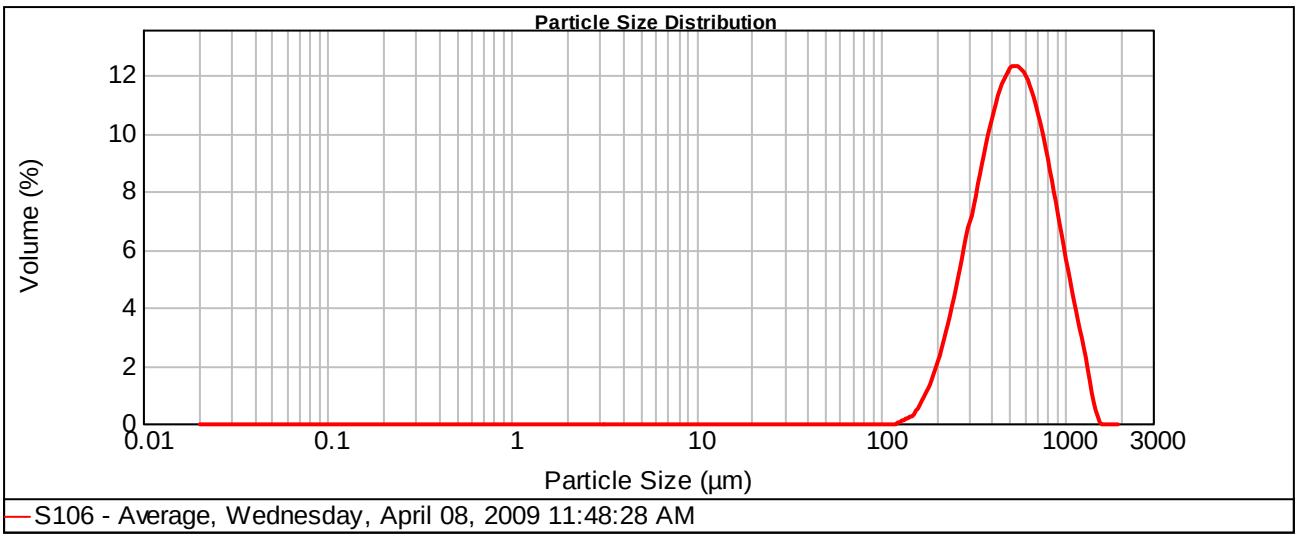

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.04	1258.925	1.56
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.23	1445.440	0.05
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	0.72	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	1.49	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	2.62	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	4.11	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	5.83	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	7.63	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	9.25	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	10.48	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	11.09	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	10.97	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	10.13	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	8.69	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	6.88	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	4.99	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	3.25		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S107 - Average

SOP Name:

Measured:
Wednesday, April 08, 2009 11:56:28 AM

Sample Source & type:
Vadanemelli

Measured by:
JohnstonP

Analysed:
Wednesday, April 08, 2009 11:56:29 AM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
20.86 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.695 %

Result Emulation:
Off

Concentration:
0.4959 %Vol

Span :
1.445

Uniformity:
0.455

Result units:
Volume

Specific Surface Area:
0.0383 m²/g

Surface Weighted Mean D[3,2]:
156.774 um

Vol. Weighted Mean D[4,3]:
550.534 um

---

d(0.1): 228.240 um **d(0.5):** 507.908 um **d(0.9):** 962.341 um

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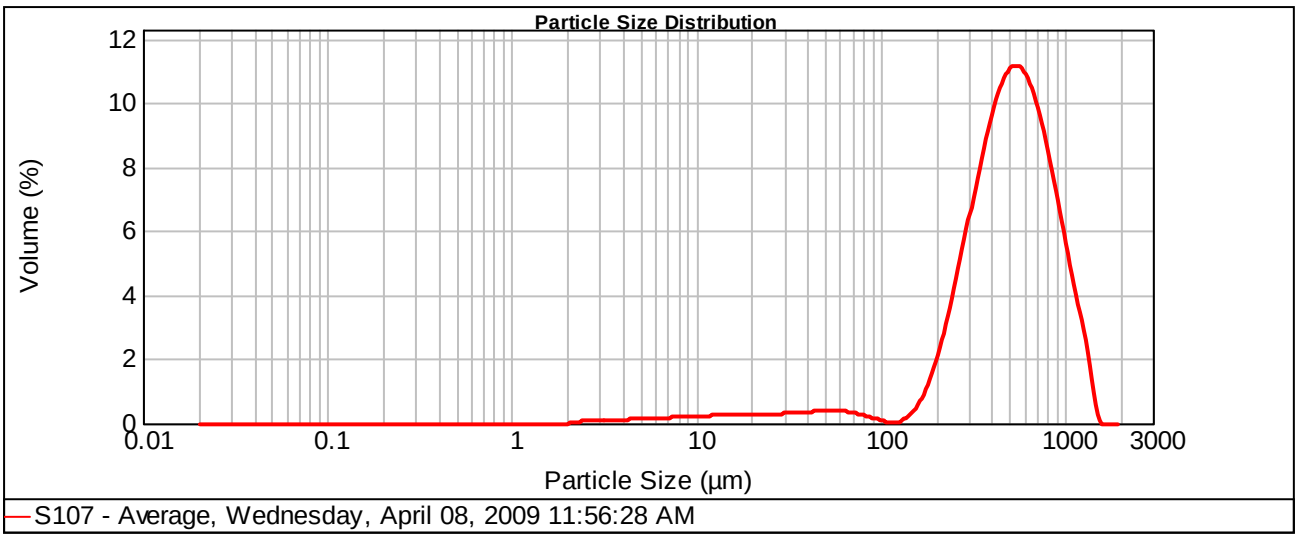


Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.22	120.226	0.06	1258.925	1.92
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.24	138.038	0.29	1445.440	0.07
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.24	158.489	0.74	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.25	181.970	1.51	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.26	208.930	2.59	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.06	22.909	0.26	239.883	3.97	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.07	26.303	0.27	275.423	5.52	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.08	30.200	0.29	316.228	7.10	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.09	34.674	0.31	363.078	8.50	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.11	39.811	0.33	416.869	9.54	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.12	45.709	0.35	478.630	10.05	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.13	52.481	0.36	549.541	9.96	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.15	60.256	0.33	630.957	9.28	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.16	69.183	0.28	724.436	8.09	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.18	79.433	0.19	831.764	6.58	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.19	91.201	0.11	954.993	4.95	10000.000	
0.091	0.00	0.955	0.00	10.000	0.21	104.713	0.03	1096.478	3.38		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S108 - Average

SOP Name:

Measured:
Wednesday, April 08, 2009 1:25:03 PM

Sample Source & type:
Vadanemelli

Measured by:
JohnstonP

Analysed:
Wednesday, April 08, 2009 1:25:05 PM

Sample bulk lot ref:
Pit1

Result Source:
Edited

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
17.94 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
2.484 %

Result Emulation:
Off

Concentration:
1.4827 %Vol

Span :
1.250

Uniformity:
0.386

Result units:
Volume

Specific Surface Area:
0.0114 m²/g

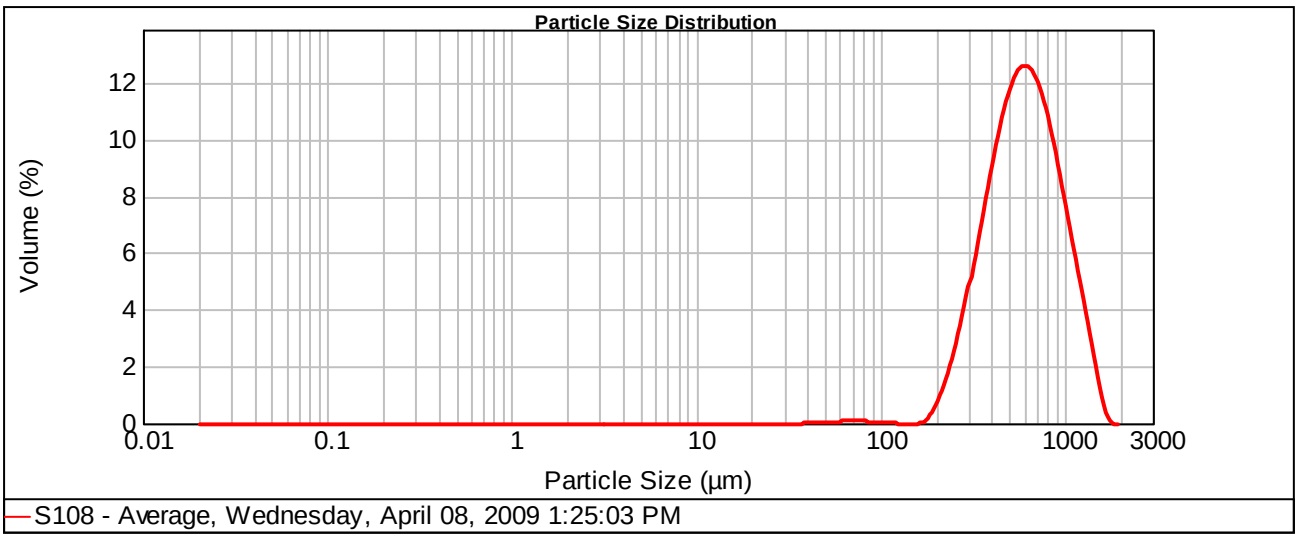
Surface Weighted Mean D[3,2]:
527.116 um

Vol. Weighted Mean D[4,3]:
656.116 um

---

d(0.1): 327.785 um **d(0.5):** 599.587 um **d(0.9):** 1077.002 um

---



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	3.08
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.00	1445.440	1.20
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	0.03	1659.587	0.06
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	0.45	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	1.25	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	2.47	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	4.07	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	5.95	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	7.87	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.03	416.869	9.58	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.04	478.630	10.81	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.05	549.541	11.36	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.07	630.957	11.12	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.07	724.436	10.14	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.06	831.764	8.58	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.04	954.993	6.73	10000.000	
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.01	1096.478	4.90		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S109 - Average

SOP Name:

Measured:
Wednesday, July 08, 2009 3:01:10 PM

Sample Source & type:
Vadanemelli

Measured by:
JohnstonP

Analysed:
Wednesday, July 08, 2009 3:01:11 PM

Sample bulk lot ref:

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
16.53 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.405 %

Result Emulation:
Off

Concentration:
0.3403 %Vol

Span :
1.614

Uniformity:
0.498

Result units:
Volume

Specific Surface Area:
0.0431 m²/g

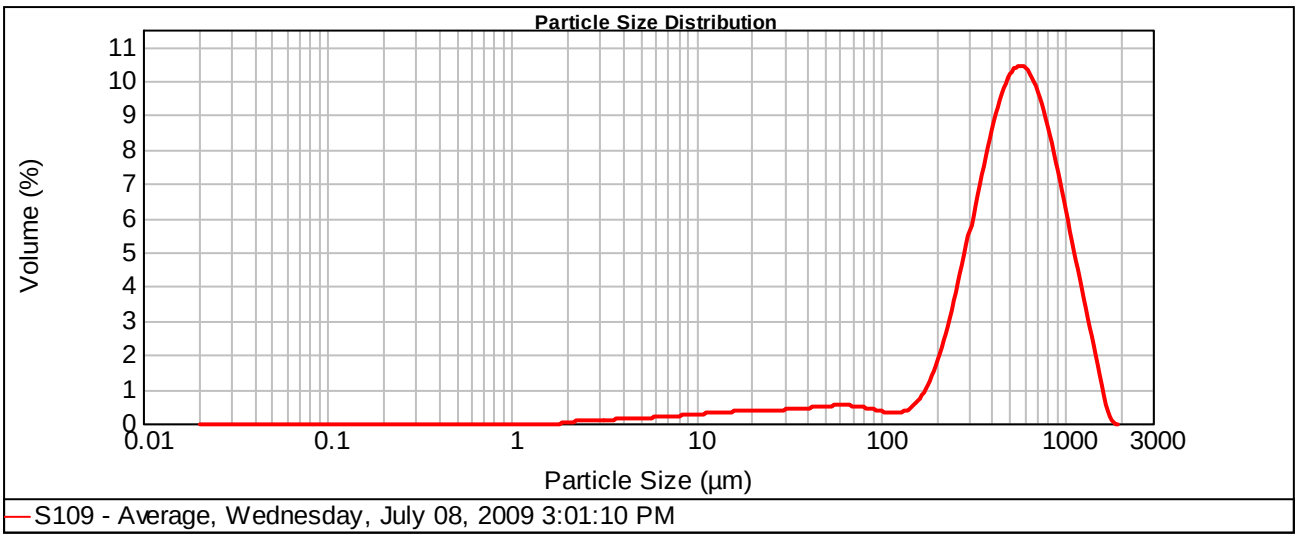
Surface Weighted Mean D[3,2]:
139.315 um

Vol. Weighted Mean D[4,3]:
575.906 um

---

d(0.1): 192.674 um **d(0.5):** 527.039 um **d(0.9):** 1043.364 um

---



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.28	120.226	0.29	1258.925	2.69
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.30	138.038	0.42	1445.440	1.32
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.31	158.489	0.75	1659.587	0.12
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.33	181.970	1.34	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.02	19.953	0.34	208.930	2.22	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.06	22.909	0.35	239.883	3.39	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.08	26.303	0.36	275.423	4.74	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.09	30.200	0.37	316.228	6.19	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.10	34.674	0.39	363.078	7.54	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.12	39.811	0.42	416.869	8.62	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.13	45.709	0.45	478.630	9.28	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.15	52.481	0.47	549.541	9.42	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.16	60.256	0.47	630.957	9.02	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.18	69.183	0.45	724.436	8.14	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.21	79.433	0.40	831.764	6.90	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.23	91.201	0.34	954.993	5.49	10000.000	
0.091	0.00	0.955	0.00	10.000	0.25	104.713	0.28	1096.478	4.07		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S110 - Average

SOP Name:

Measured:
Wednesday, July 08, 2009 3:09:08 PM

Sample Source & type:
Vadanemelli

Measured by:
JohnstonP

Analysed:
Wednesday, July 08, 2009 3:09:09 PM

Sample bulk lot ref:

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
17.07 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.796 %

Result Emulation:
Off

Concentration:
1.2921 %Vol

Span :
1.292

Uniformity:
0.394

Result units:
Volume

Specific Surface Area:
0.0123 m²/g

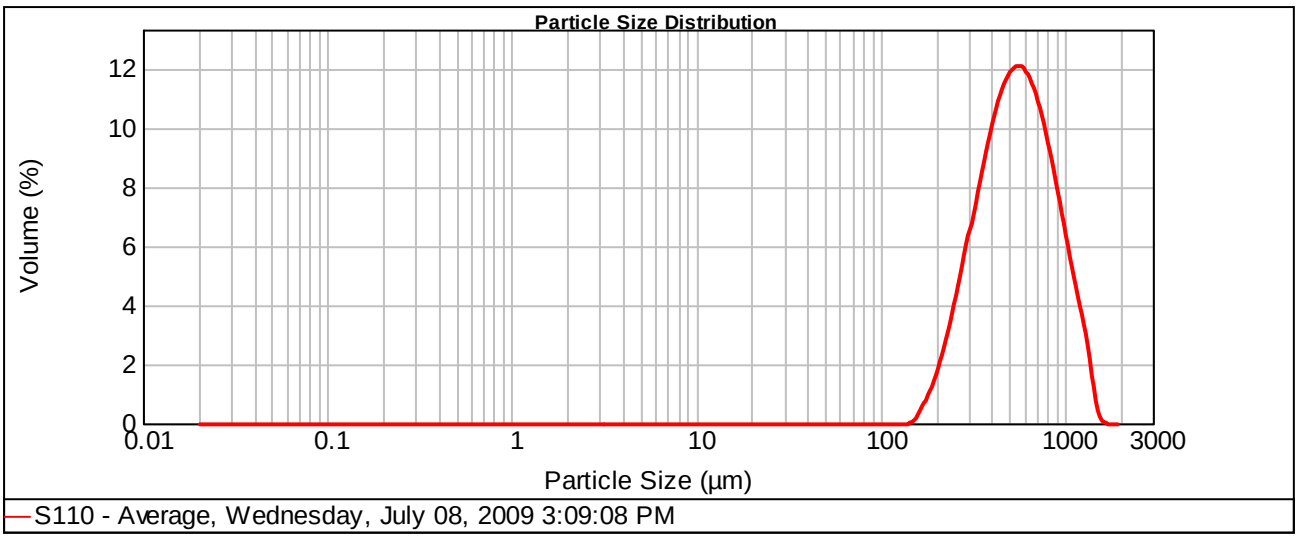
Surface Weighted Mean D[3,2]:
486.045 um

Vol. Weighted Mean D[4,3]:
600.042 um

---

d(0.1): 291.451 um **d(0.5):** 545.866 um **d(0.9):** 996.535 um

---



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	2.23
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.03	1445.440	0.19
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	0.51	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	1.25	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	2.36	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	3.81	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	5.49	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	7.25	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	8.87	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	10.13	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	10.83	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	10.87	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	10.24	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	9.02	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	7.41	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	5.63	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	3.88		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S111 - Average

SOP Name:

Measured:
Wednesday, July 08, 2009 3:16:29 PM

Sample Source & type:
Vadanemelli

Measured by:
JohnstonP

Analysed:
Wednesday, July 08, 2009 3:16:31 PM

Sample bulk lot ref:

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
16.39 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.315 %

Result Emulation:
Off

Concentration:
0.6234 %Vol

Span :
1.514

Uniformity:
0.471

Result units:
Volume

Specific Surface Area:
0.024 m²/g

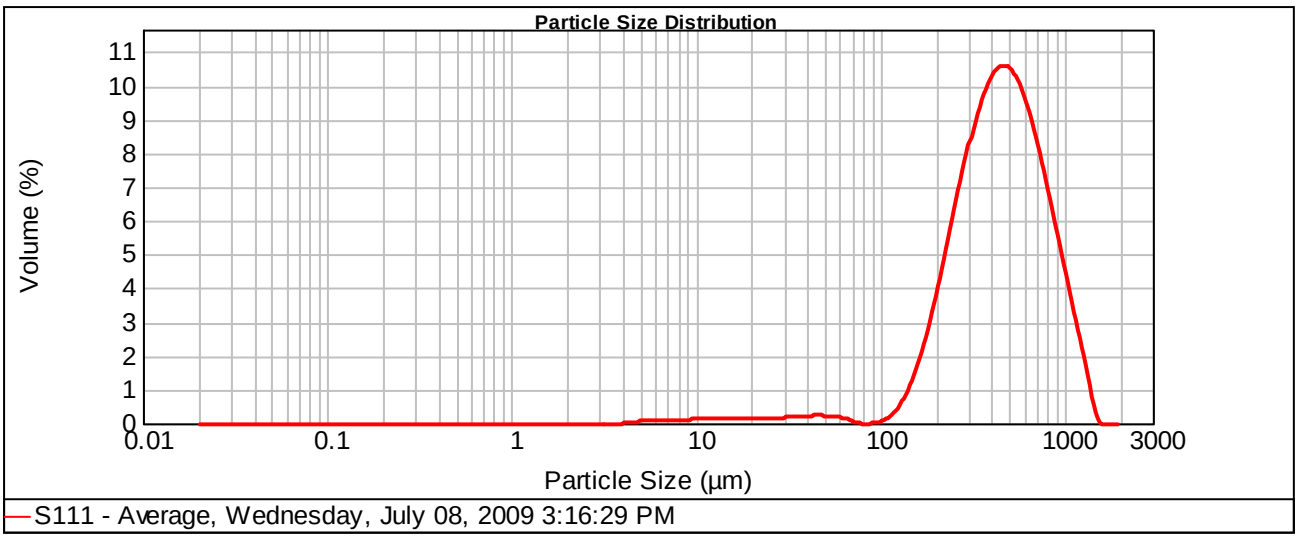
Surface Weighted Mean D[3,2]:
249.707 um

Vol. Weighted Mean D[4,3]:
504.748 um

---

d(0.1): 212.483 um **d(0.5):** 450.095 um **d(0.9):** 893.992 um

---



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.12	120.226	0.52	1258.925	1.19
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.12	138.038	1.11	1445.440	0.04
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.12	158.489	1.97	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.12	181.970	3.12	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.12	208.930	4.45	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.12	239.883	5.88	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.13	275.423	7.24	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.15	316.228	8.40	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.17	363.078	9.20	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.01	39.811	0.19	416.869	9.56	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.04	45.709	0.21	478.630	9.44	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.07	52.481	0.21	549.541	8.85	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.08	60.256	0.18	630.957	7.88	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.09	69.183	0.14	724.436	6.64	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.10	79.433	0.02	831.764	5.27	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.11	91.201	0.00	954.993	3.90	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.11	104.713	0.03	1096.478	2.53		
0.105	0.00	1.096	0.00	11.482	0.11	120.226	0.18	1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S112 - Average

SOP Name:

Measured:
Wednesday, July 08, 2009 3:23:55 PM

Sample Source & type:
Vadanemelli

Measured by:
JohnstonP

Analysed:
Wednesday, July 08, 2009 3:23:56 PM

Sample bulk lot ref:

Result Source:
Edited

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
16.76 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.746 %

Result Emulation:
Off

Concentration:
0.6827 %Vol

Span :
1.331

Uniformity:
0.416

Result units:
Volume

Specific Surface Area:
0.0224 m²/g

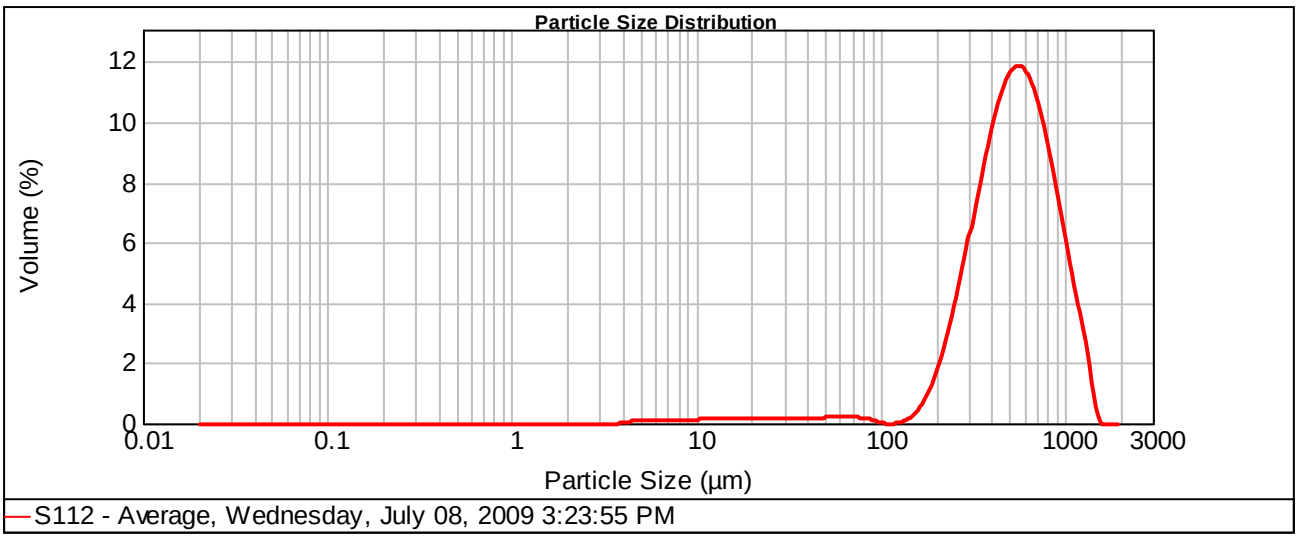
Surface Weighted Mean D[3,2]:
268.318 um

Vol. Weighted Mean D[4,3]:
577.996 um

---

d(0.1): 266.934 um **d(0.5):** 532.893 um **d(0.9):** 976.104 um

---



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.13	120.226	0.02	1258.925	1.95
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.14	138.038	0.20	1445.440	0.07
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.14	158.489	0.58	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.14	181.970	1.27	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.13	208.930	2.30	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.12	239.883	3.68	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.12	275.423	5.29	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.12	316.228	7.02	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.13	363.078	8.62	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.03	39.811	0.15	416.869	9.89	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.07	45.709	0.18	478.630	10.61	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.07	52.481	0.20	549.541	10.67	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.08	60.256	0.20	630.957	10.03	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.09	69.183	0.18	724.436	8.79	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.10	79.433	0.14	831.764	7.15	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.11	91.201	0.04	954.993	5.34	10000.000	
0.091	0.00	0.955	0.00	10.000	0.12	104.713	0.00	1096.478	3.60		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S113 - Average

SOP Name:

Measured:
Wednesday, July 08, 2009 3:32:22 PM

Sample Source & type:
Vadanemelli

Measured by:
JohnstonP

Analysed:
Wednesday, July 08, 2009 3:32:24 PM

Sample bulk lot ref:

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
15.01 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.407 %

Result Emulation:
Off

Concentration:
0.4497 %Vol

Span :
1.613

Uniformity:
0.5

Result units:
Volume

Specific Surface Area:
0.03 m²/g

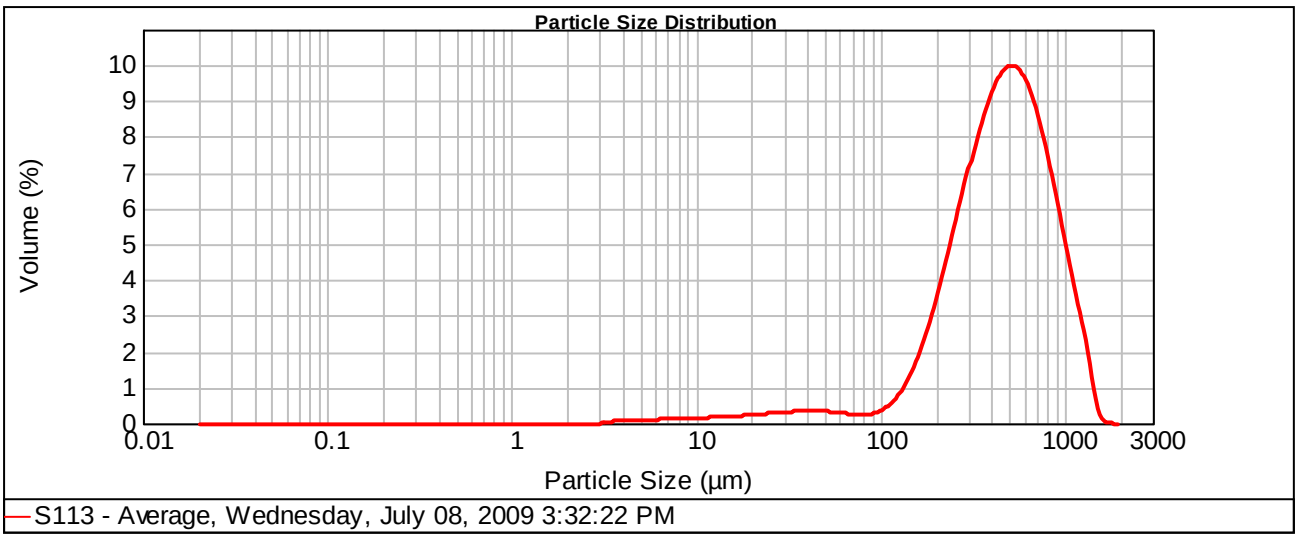
Surface Weighted Mean D[3,2]:
199.803 um

Vol. Weighted Mean D[4,3]:
517.096 um

---

d(0.1): 188.350 um **d(0.5):** 464.944 um **d(0.9):** 938.438 um

---



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.15	120.226	0.78	1258.925	1.73
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.17	138.038	1.28	1445.440	0.20
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.18	158.489	1.98	1659.587	0.01
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.20	181.970	2.87	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.22	208.930	3.92	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.25	239.883	5.08	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.27	275.423	6.25	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.01	30.200	0.29	316.228	7.34	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.05	34.674	0.31	363.078	8.23	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.07	39.811	0.32	416.869	8.82	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.08	45.709	0.31	478.630	9.02	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.09	52.481	0.29	549.541	8.78	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.10	60.256	0.25	630.957	8.12	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.11	69.183	0.23	724.436	7.07	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.12	79.433	0.23	831.764	5.78	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.13	91.201	0.30	954.993	4.38	10000.000	
0.091	0.00	0.955	0.00	10.000	0.14	104.713	0.47	1096.478	3.02		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S114 - Average

SOP Name:

Measured:
Wednesday, July 08, 2009 6:07:56 PM

Sample Source & type:
Vadanemelli

Measured by:
JohnstonP

Analysed:
Wednesday, July 08, 2009 6:07:58 PM

Sample bulk lot ref:

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
18.13 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
2.472 %

Result Emulation:
Off

Concentration:
1.6049 %Vol

Span :
1.114

Uniformity:
0.345

Result units:
Volume

Specific Surface Area:
0.0106 m²/g

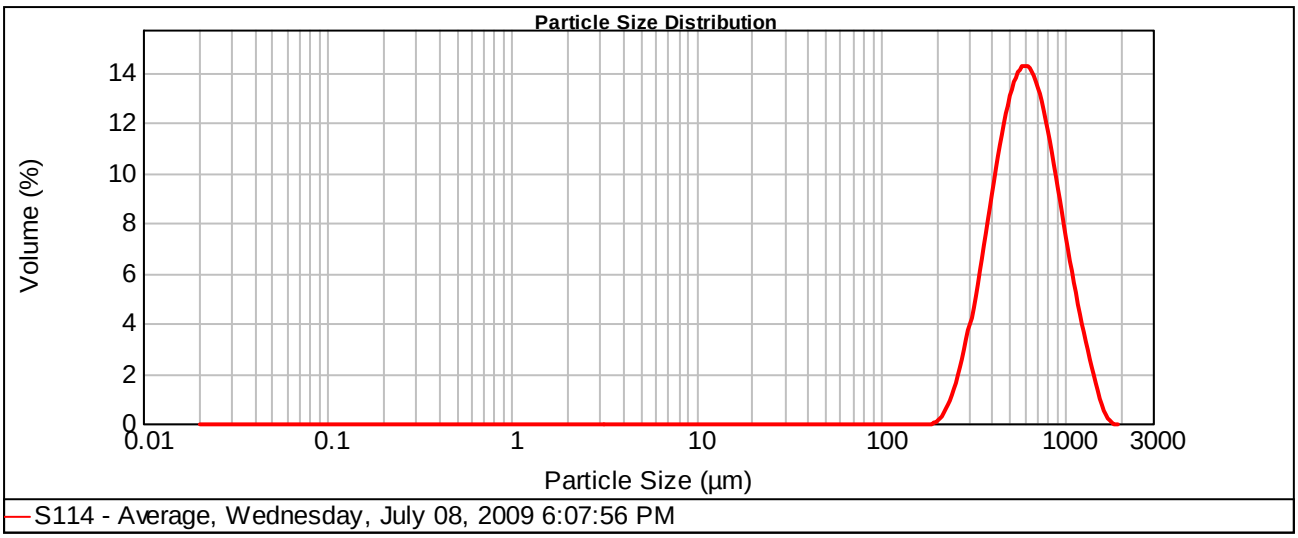
Surface Weighted Mean D[3,2]:
565.112 um

Vol. Weighted Mean D[4,3]:
662.330 um

---

d(0.1): 361.944 um **d(0.5):** 610.119 um **d(0.9):** 1041.325 um

---



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	2.51
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.00	1445.440	0.95
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	0.00	1659.587	0.05
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	0.01	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	0.38	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	1.40	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	3.06	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	5.30	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	7.83	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	10.25	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	12.05	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	12.86	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	12.51	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	11.08	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	8.92	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	6.51	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	4.34		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S115 - Average

SOP Name:

Measured:
Tuesday, October 21, 2008 6:59:27 PM

Sample Source & type:
Aalikuppam

Measured by:
student

Analysed:
Tuesday, October 21, 2008 6:59:29 PM

Sample bulk lot ref:
Pit2

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
19.00 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.217 %

Result Emulation:
Off

Concentration:
1.1636 %Vol

Span :
1.213

Uniformity:
0.374

Result units:
Volume

Specific Surface Area:
0.0154 m²/g

Surface Weighted Mean D[3,2]:
388.990 um

Vol. Weighted Mean D[4,3]:
468.179 um

d(0.1): 239.638 um **d(0.5):** 429.027 um **d(0.9):** 760.175 um

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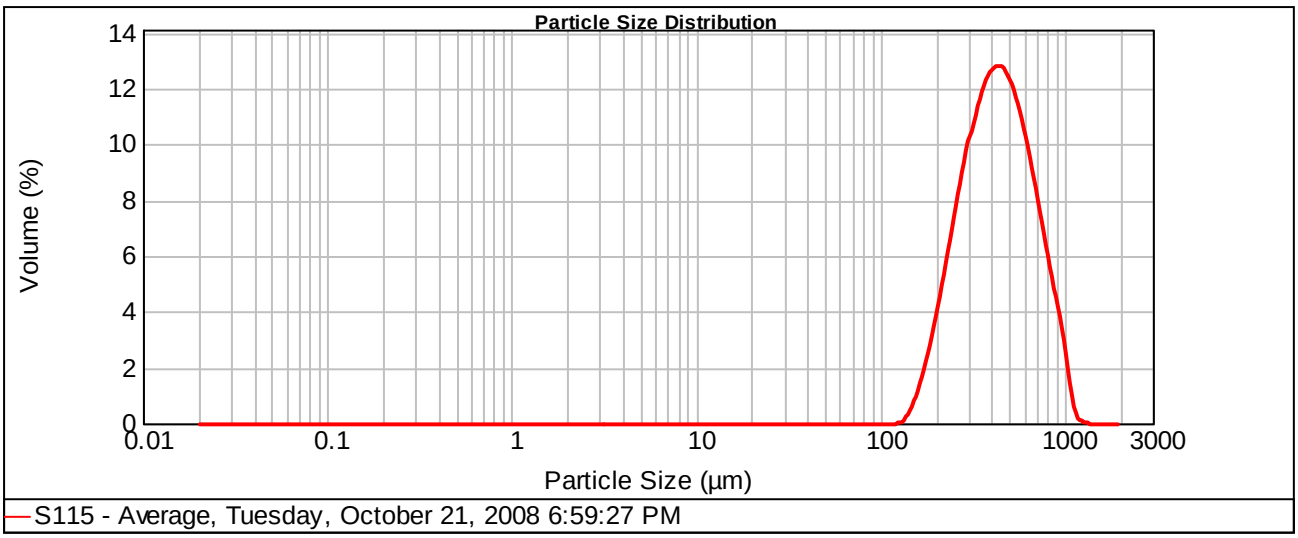

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.03	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.52	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	1.56	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	3.05	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	4.88	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	6.91	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	8.84	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	10.42	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	11.37	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	11.55	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	10.95	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	9.67	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	7.93	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	5.96	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	4.09	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	2.07	10000.000	
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	0.18		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S116 - Average

SOP Name:

Measured:
Tuesday, October 21, 2008 7:07:32 PM

Sample Source & type:
Aalikuppam

Measured by:
student

Analysed:
Tuesday, October 21, 2008 7:07:34 PM

Sample bulk lot ref:
Pit2

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
19.05 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.268 %

Result Emulation:
Off

Concentration:
1.2551 %Vol

Span :
1.295

Uniformity:
0.396

Result units:
Volume

Specific Surface Area:
0.0143 m²/g

Surface Weighted Mean D[3,2]:
418.158 um

Vol. Weighted Mean D[4,3]:
515.921 um

d(0.1): 250.992 um **d(0.5):** 468.490 um **d(0.9):** 857.755 um

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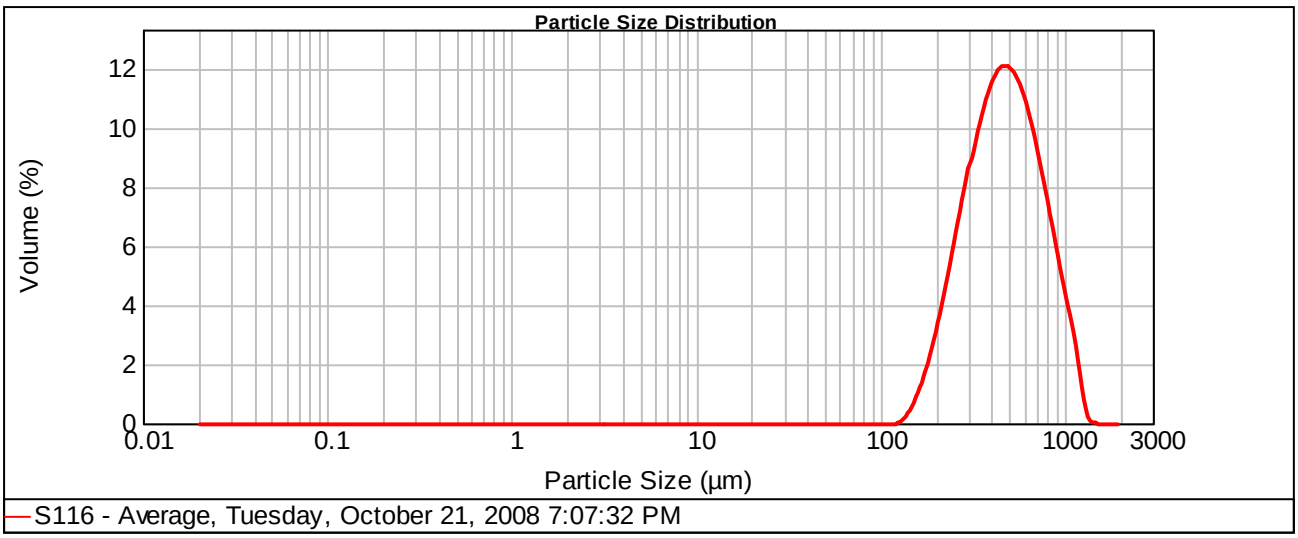

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.04	1258.925	0.15
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.50	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	1.30	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	2.49	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	3.99	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	5.73	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	7.48	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	9.07	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	10.25	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	10.86	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	10.80	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	10.09	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	8.83	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	7.22	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	5.45	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	3.75	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	2.02		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S117 - Average

SOP Name:

Measured:
Tuesday, October 21, 2008 7:15:40 PM

Sample Source & type:
Aalikuppam

Measured by:
student

Analysed:
Tuesday, October 21, 2008 7:15:42 PM

Sample bulk lot ref:
Pit3

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
18.49 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.318 %

Result Emulation:
Off

Concentration:
1.2685 %Vol

Span :
1.347

Uniformity:
0.413

Result units:
Volume

Specific Surface Area:
0.0137 m²/g

Surface Weighted Mean D[3,2]:
436.961 um

Vol. Weighted Mean D[4,3]:
545.537 um

d(0.1): 259.976 um **d(0.5):** 490.009 um **d(0.9):** 920.069 um

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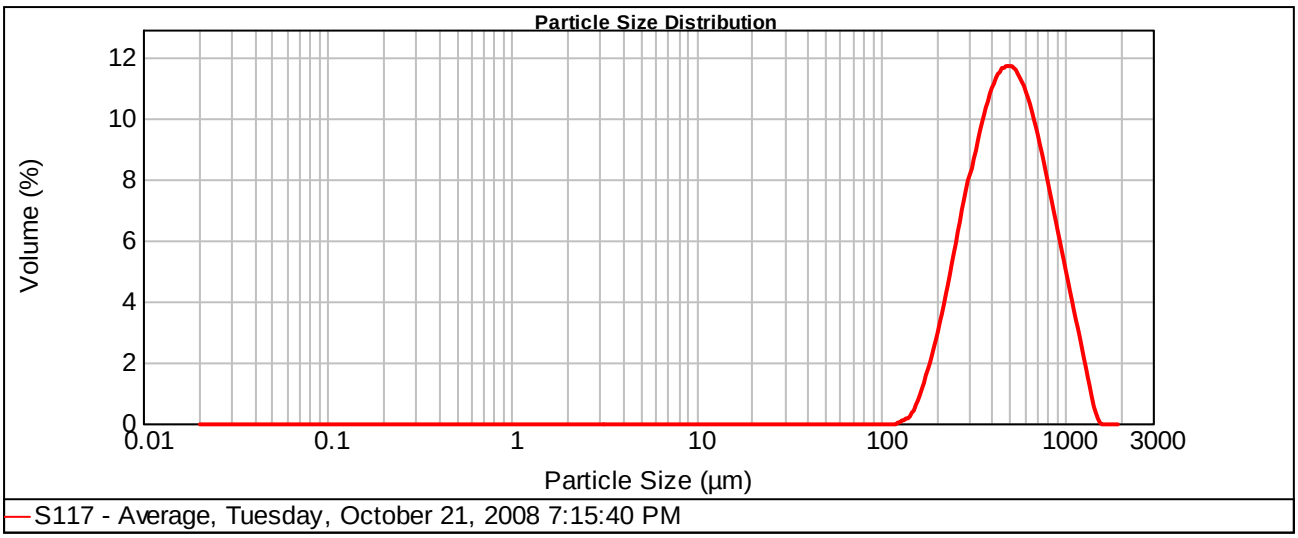


Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.04	1258.925	1.26
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.26	1445.440	0.04
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	1.09	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	2.16	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	3.59	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	5.26	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	6.97	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	8.56	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	9.77	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	10.48	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	10.58	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	10.06	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	9.03	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	7.60	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	6.00	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	4.42	10000.000	
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	2.82		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S118 - Average

SOP Name:

Measured:
Tuesday, October 21, 2008 7:25:10 PM

Sample Source & type:
Aalikuppam

Measured by:
student

Analysed:
Tuesday, October 21, 2008 7:25:11 PM

Sample bulk lot ref:
Pit3

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
16.15 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.790 %

Result Emulation:
Off

Concentration:
1.3262 %Vol

Span :
1.151

Uniformity:
0.355

Result units:
Volume

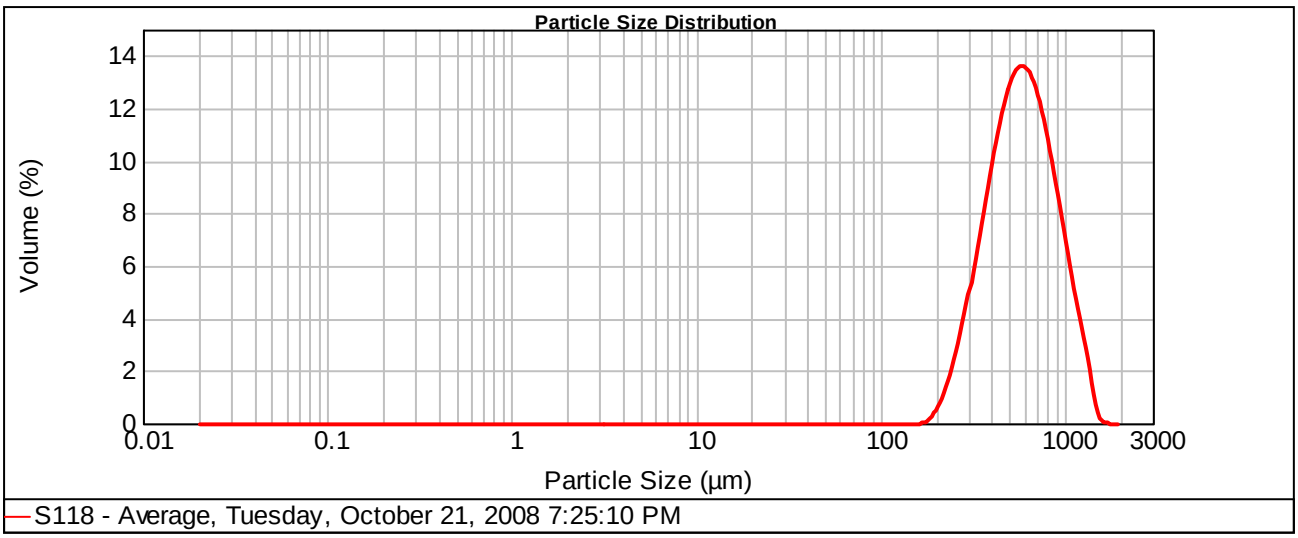
Specific Surface Area:
0.0113 m²/g

Surface Weighted Mean D[3,2]:
530.088 um

Vol. Weighted Mean D[4,3]:
628.812 um

---

d(0.1): 333.106 um **d(0.5):** 580.423 um **d(0.9):** 1001.195 um



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	2.10
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.00	1445.440	0.20
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	0.01	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	0.32	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	1.08	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	2.36	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	4.13	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	6.30	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	8.54	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	10.53	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	11.87	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	12.30	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	11.73	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	10.28	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	8.26	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	6.05	10000.000	
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	3.96		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S119 - Average

SOP Name:

Measured:
Tuesday, October 21, 2008 7:34:17 PM

Sample Source & type:
Aalikuppam

Measured by:
student

Analysed:
Tuesday, October 21, 2008 7:34:18 PM

Sample bulk lot ref:
Pit3

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
18.75 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.287 %

Result Emulation:
Off

Concentration:
1.2588 %Vol

Span :
1.082

Uniformity:
0.333

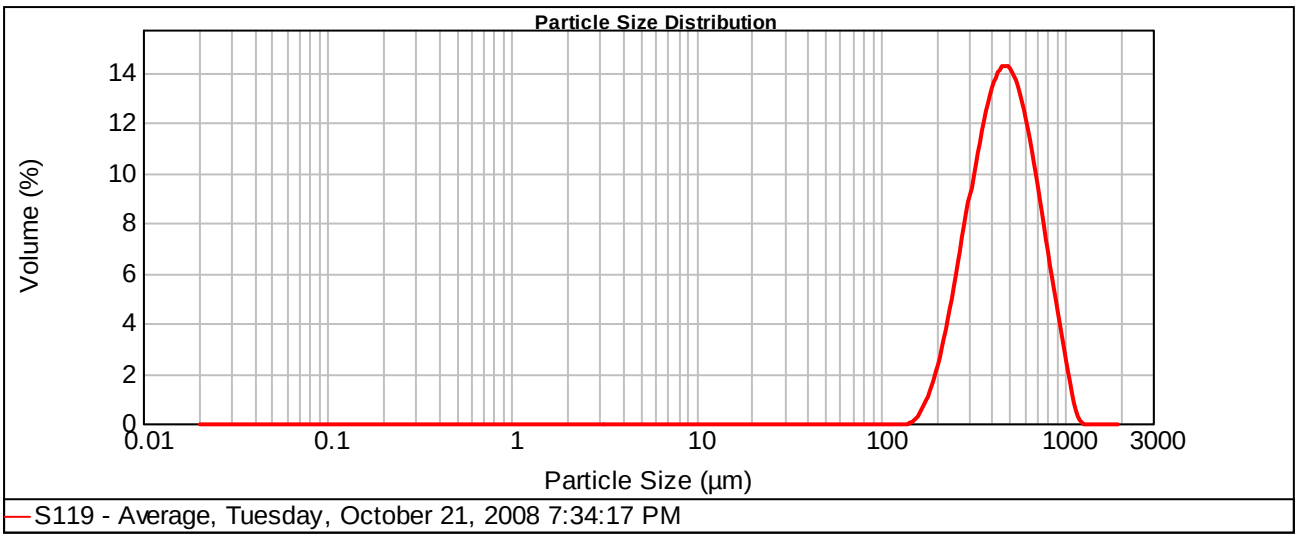
Result units:
Volume

Specific Surface Area:
0.0141 m²/g

Surface Weighted Mean D[3,2]:
426.921 um

Vol. Weighted Mean D[4,3]:
498.302 um

d(0.1): 272.803 um **d(0.5):** 465.014 um **d(0.9):** 775.804 um



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.03	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	0.54	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	1.53	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	3.11	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	5.23	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	7.63	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	9.99	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	11.83	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	12.81	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	12.69	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	11.47	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	9.40	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	6.90	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	4.42	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	2.15	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	0.27		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S120 - Average

SOP Name:

Measured:
Tuesday, October 21, 2008 7:49:11 PM

Sample Source & type:
Aalikuppam

Measured by:
student

Analysed:
Tuesday, October 21, 2008 7:49:12 PM

Sample bulk lot ref:
Pit4

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
17.46 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.297 %

Result Emulation:
Off

Concentration:
1.1792 %Vol

Span :
1.067

Uniformity:
0.327

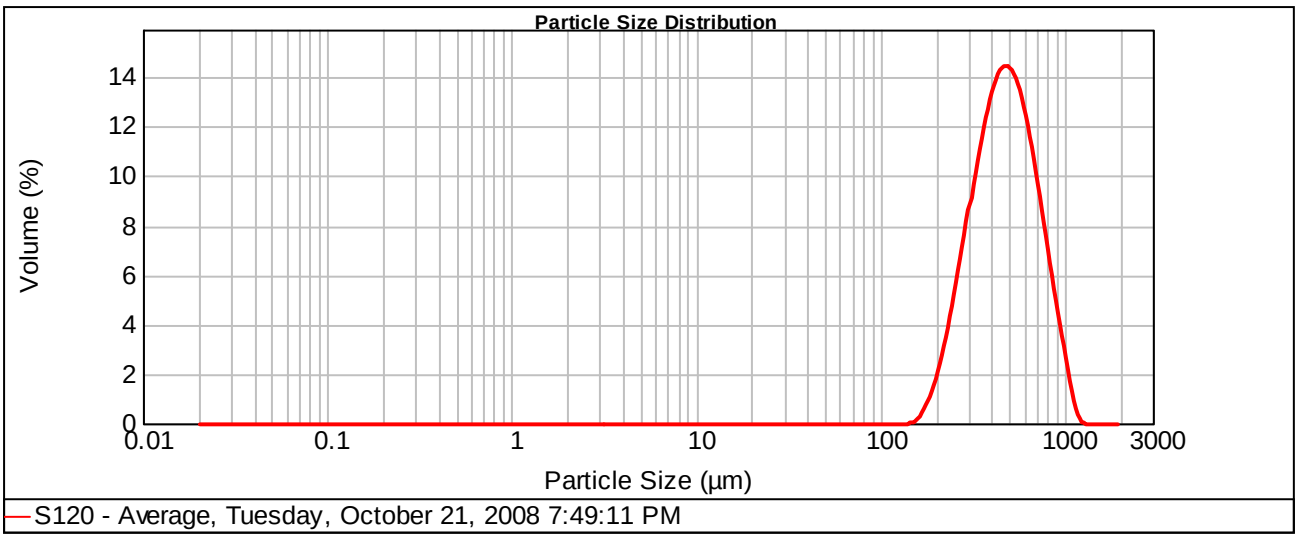
Result units:
Volume

Specific Surface Area:
0.0139 m²/g

Surface Weighted Mean D[3,2]:
432.762 um

Vol. Weighted Mean D[4,3]:
503.194 um

d(0.1): 277.894 um **d(0.5):** 470.361 um **d(0.9):** 779.650 um



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.02	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	0.41	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	1.34	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	2.86	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	4.97	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	7.41	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	9.87	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	11.84	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	12.94	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	12.90	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	11.72	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	9.63	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	7.08	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	4.52	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	2.20	10000.000	
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	0.29		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S121 - Average

SOP Name:

Measured:
Tuesday, October 21, 2008 8:00:48 PM

Sample Source & type:
Aalikuppam

Measured by:
student

Analysed:
Tuesday, October 21, 2008 8:00:50 PM

Sample bulk lot ref:
Pit4

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
18.56 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
1.186 %

Result Emulation:
Off

Concentration:
1.1984 %Vol

Span :
1.071

Uniformity:
0.332

Result units:
Volume

Specific Surface Area:
0.0146 m²/g

Surface Weighted Mean D[3,2]:
411.171 um

Vol. Weighted Mean D[4,3]:
478.322 um

d(0.1): 263.678 um **d(0.5):** 446.837 um **d(0.9):** 742.333 um

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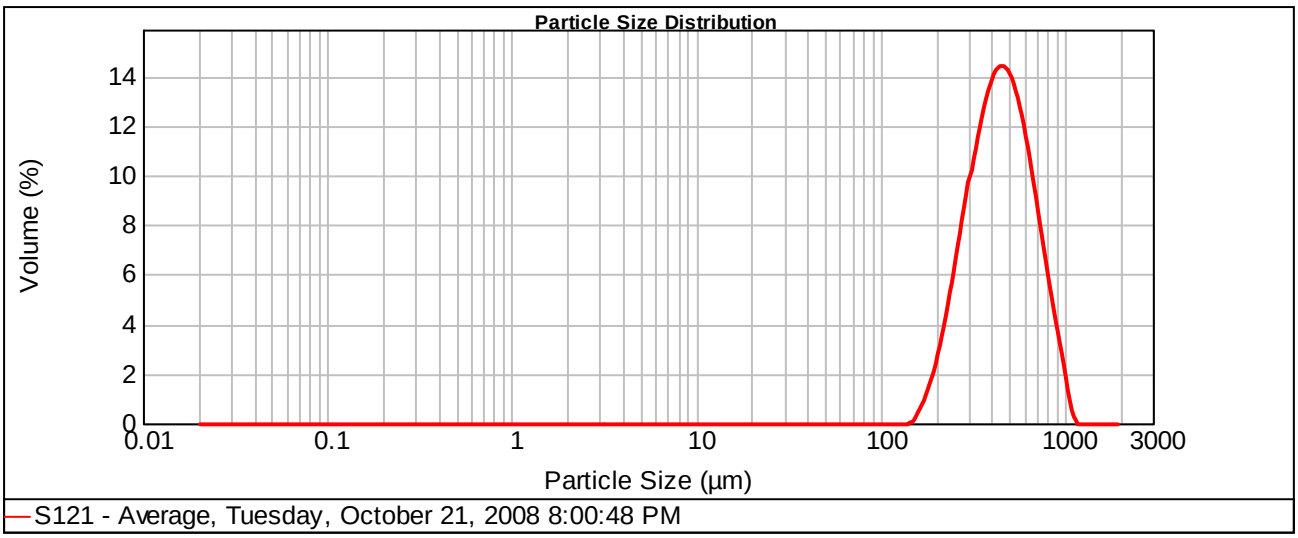

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	0.05	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	0.72	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	1.86	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	3.61	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	5.88	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	8.35	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	10.67	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	12.33	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	13.02	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	12.54	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	10.99	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	8.71	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	6.11	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	3.70	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	1.46	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.00	1096.478	0.00		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925	0.00		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S122 - Average

SOP Name:

Measured:
Wednesday, January 21, 2009 7:38:53 PM

Sample Source & type:
Karrikatakuppam

Measured by:
Unknown

Analysed:
Wednesday, January 21, 2009 7:38:54 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
20.32 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.606 %

Result Emulation:
Off

Concentration:
0.9935 %Vol

Span :
1.085

Uniformity:
0.335

Result units:
Volume

Specific Surface Area:
0.0195 m²/g

Surface Weighted Mean D[3,2]:
307.969 um

Vol. Weighted Mean D[4,3]:
358.620 um

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d(0.1): 197.886 um **d(0.5):** 333.163 um **d(0.9):** 559.358 um

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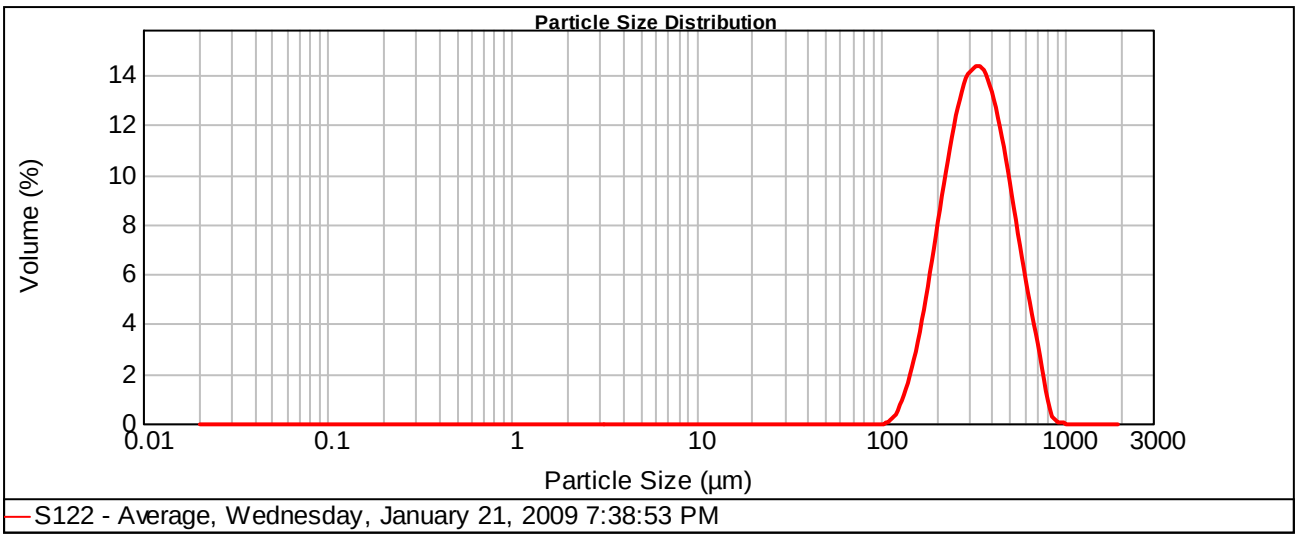

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.69	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	1.94	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	3.82	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	6.23	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	8.76	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	11.04	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	12.54	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	12.98	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	12.26	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	10.55	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	8.25	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	5.79	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	3.63	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	1.36	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	0.10	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	0.00	10000.000	
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.07	1096.478	0.00		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S123 - Average

SOP Name:

Measured:
Wednesday, January 21, 2009 7:47:01 PM

Sample Source & type:
Karrikatakuppam

Measured by:
Unknown

Analysed:
Wednesday, January 21, 2009 7:47:02 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
15.53 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.496 %

Result Emulation:
Off

Concentration:
0.7341 %Vol

Span :
1.054

Uniformity:
0.327

Result units:
Volume

Specific Surface Area:
0.0196 m²/g

Surface Weighted Mean D[3,2]:
306.363 um

Vol. Weighted Mean D[4,3]:
354.249 um

d(0.1): 198.325 um **d(0.5):** 330.798 um **d(0.9):** 546.968 um

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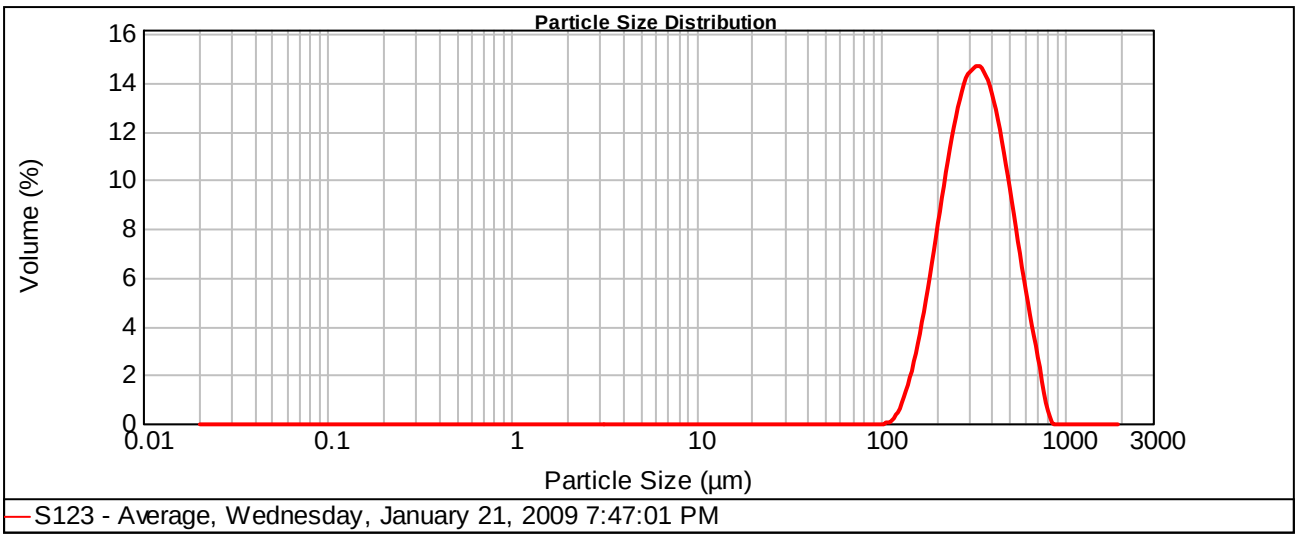

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.62	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	1.90	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	3.81	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	6.29	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	8.90	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	11.26	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	12.82	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	13.26	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	12.48	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	10.65	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	8.19	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	5.57	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	3.24	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	0.95	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	0.00	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	0.00	10000.000	
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.05	1096.478	0.00		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S124 - Average

SOP Name:

Measured:
Wednesday, January 21, 2009 7:53:19 PM

Sample Source & type:
Karrikatakuppam

Measured by:
Unknown

Analysed:
Wednesday, January 21, 2009 7:53:21 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
18.43 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.638 %

Result Emulation:
Off

Concentration:
1.0129 %Vol

Span :
1.173

Uniformity:
0.362

Result units:
Volume

Specific Surface Area:
0.0171 m²/g

Surface Weighted Mean D[3,2]:
350.223 um

Vol. Weighted Mean D[4,3]:
419.242 um

d(0.1): 216.518 um **d(0.5):** 388.283 um **d(0.9):** 672.167 um

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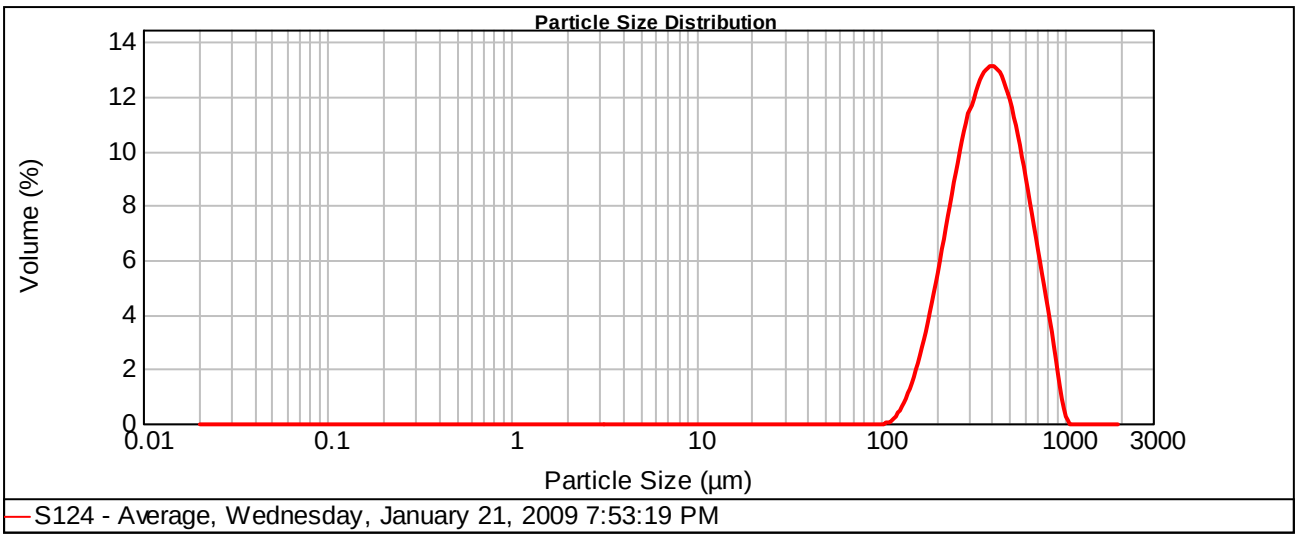


Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.47	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	1.30	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	2.55	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	4.24	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	6.17	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	8.20	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	9.99	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	11.29	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	11.84	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	11.54	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	10.42	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	8.66	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	6.55	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	4.42	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	2.17	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.00	954.993	0.14	10000.000	
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.04	1096.478	0.00		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.00	1258.925			

Operator notes: *stratigraphically above 123*

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S125 - Average

SOP Name:

Measured:
Wednesday, January 21, 2009 8:00:33 PM

Sample Source & type:
Karrikatakuppam

Measured by:
Unknown

Analysed:
Wednesday, January 21, 2009 8:00:34 PM

Sample bulk lot ref:
Pit3

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
22.62 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.495 %

Result Emulation:
Off

Concentration:
1.1787 %Vol

Span :
1.422

Uniformity:
0.439

Result units:
Volume

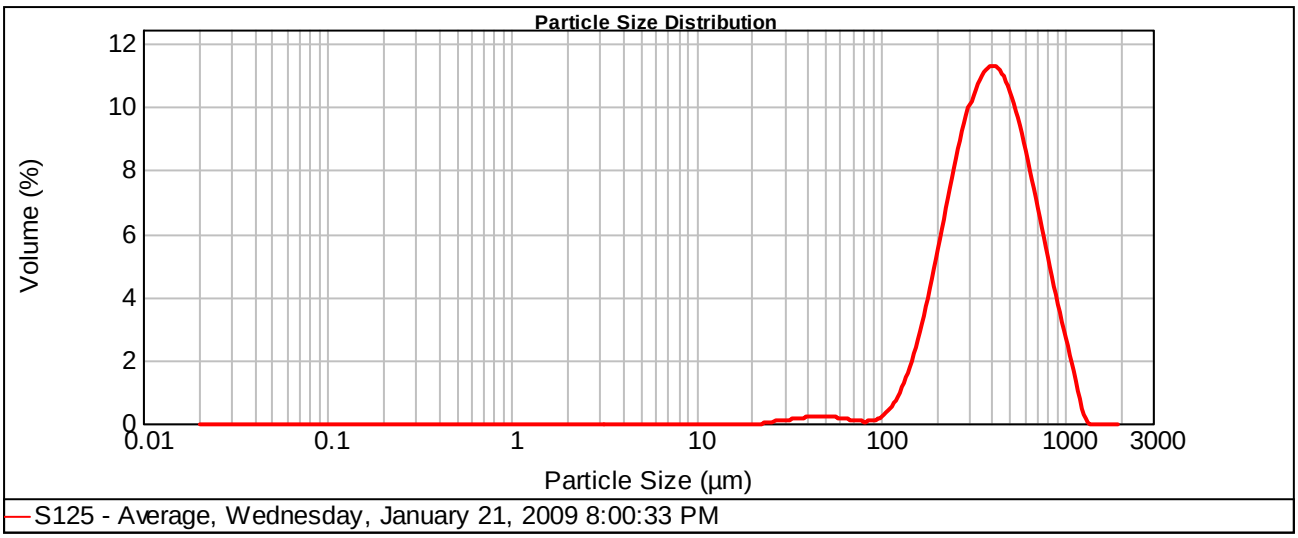
Specific Surface Area:
0.0185 m²/g

Surface Weighted Mean D[3,2]:
324.288 um

Vol. Weighted Mean D[4,3]:
442.862 um

d(0.1): 199.407 um **d(0.5):** 396.236 um **d(0.9):** 763.019 um

---



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.92	1258.925	0.01
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	1.75	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	2.89	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	4.32	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	5.89	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	7.46	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.02	275.423	8.81	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.08	316.228	9.77	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.12	363.078	10.20	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.16	416.869	10.03	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.19	478.630	9.30	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.20	549.541	8.13	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.17	630.957	6.68	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.13	724.436	5.14	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.07	831.764	3.67	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.06	954.993	2.33	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.14	1096.478	0.96		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	0.41	1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S126 - Average

Sample Source & type:
Karrikatakuppam

Sample bulk lot ref:
Pit3

SOP Name:

Measured by:
Unknown

Result Source:
Averaged

Measured:
Wednesday, January 21, 2009 8:06:17 PM

Analysed:
Wednesday, January 21, 2009 8:06:18 PM

Particle Name:
Default

Particle RI:
1.520

Dispersant Name:
Water

Accessory Name:
Hydro 2000G (A)

Absorption:
0.1

Dispersant RI:
1.330

Analysis model:
General purpose

Size range:
0.020 to 2000.000 um

Weighted Residual:
0.474 %

Sensitivity:
Normal

Obscuration:
21.64 %

Result Emulation:
Off

Concentration:
0.9659 %Vol

Span :
1.508

Uniformity:
0.464

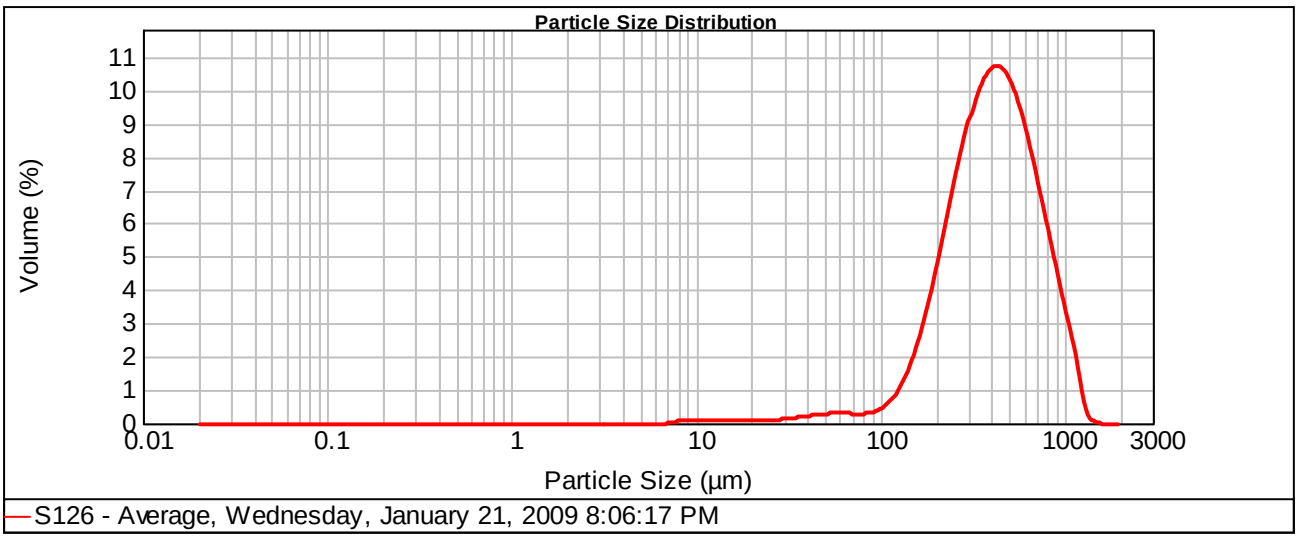
Result units:
Volume

Specific Surface Area:
0.0213 m²/g

Surface Weighted Mean D[3,2]:
281.170 um

Vol. Weighted Mean D[4,3]:
457.930 um

d(0.1): 190.897 um **d(0.5):** 409.602 um **d(0.9):** 808.535 um



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.07	120.226	0.99	1258.925	0.19
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.06	138.038	1.67	1445.440	0.01
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.06	158.489	2.63	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.06	181.970	3.85	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.07	208.930	5.24	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.08	239.883	6.69	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.10	275.423	8.00	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.14	316.228	9.03	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.18	363.078	9.60	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.22	416.869	9.65	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.26	478.630	9.19	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.27	549.541	8.27	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.27	630.957	7.04	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.26	724.436	5.66	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.01	79.433	0.28	831.764	4.28	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.06	91.201	0.36	954.993	2.92	10000.000	
0.091	0.00	0.955	0.00	10.000	0.06	104.713	0.58	1096.478	1.55		
0.105		1.096		11.482	0.07	120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S127 - Average

SOP Name:

Measured:
Wednesday, January 21, 2009 8:12:09 PM

Sample Source & type:
Karrikatakuppam

Measured by:
Unknown

Analysed:
Wednesday, January 21, 2009 8:12:11 PM

Sample bulk lot ref:
Pit4

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
19.63 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.569 %

Result Emulation:
Off

Concentration:
0.9485 %Vol

Span :
1.301

Uniformity:
0.404

Result units:
Volume

Specific Surface Area:
0.0196 m²/g

Surface Weighted Mean D[3,2]:
306.160 um

Vol. Weighted Mean D[4,3]:
403.470 um

d(0.1): 192.502 um **d(0.5):** 369.235 um **d(0.9):** 672.938 um

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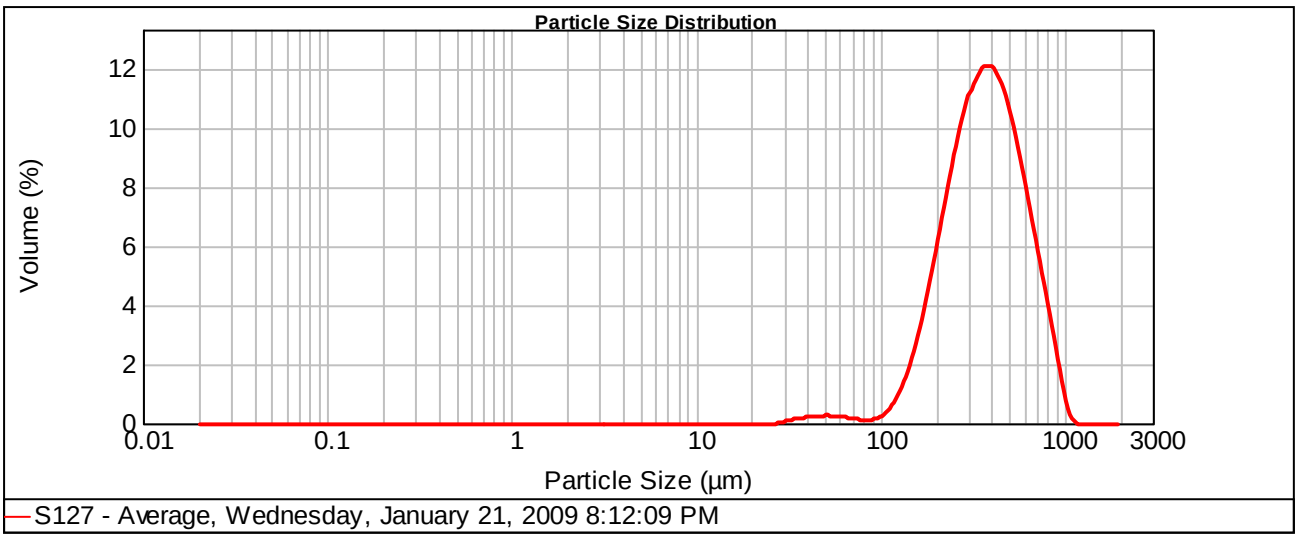

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	1.01	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	1.95	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	3.24	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	4.88	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	6.65	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	8.39	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.02	275.423	9.81	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.11	316.228	10.71	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.17	363.078	10.93	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.21	416.869	10.42	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.24	478.630	9.29	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.23	549.541	7.70	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.19	630.957	5.92	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.13	724.436	4.15	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.10	831.764	2.33	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.17	954.993	0.59	10000.000	
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.45	1096.478	0.00		
0.105	0.00	1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S128 - Average

SOP Name:

Measured:
Wednesday, January 21, 2009 8:19:11 PM

Sample Source & type:
Muttukaddu

Measured by:
Unknown

Analysed:
Wednesday, January 21, 2009 8:19:13 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
18.56 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.253 %

Result Emulation:
Off

Concentration:
0.1956 %Vol

Span :
1.998

Uniformity:
0.642

Result units:
Volume

Specific Surface Area:
0.0849 m²/g

Surface Weighted Mean D[3,2]:
70.661 um

Vol. Weighted Mean D[4,3]:
198.355 um

---

d(0.1): 66.610 um **d(0.5):** 158.535 um **d(0.9):** 383.383 um

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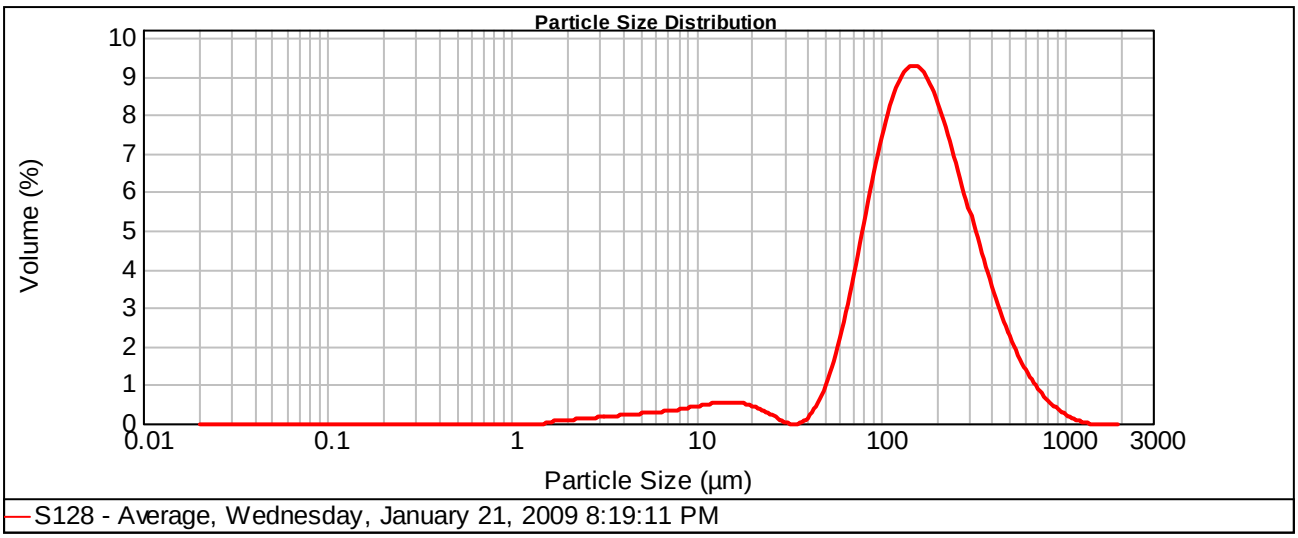

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.47	120.226	8.08	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.50	138.038	8.37	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.01	15.136	0.50	158.489	8.25	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.06	17.378	0.46	181.970	7.77	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.08	19.953	0.37	208.930	7.04	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.10	22.909	0.25	239.883	6.14	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.12	26.303	0.09	275.423	5.18	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.15	30.200	0.00	316.228	4.23	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.17	34.674	0.02	363.078	3.35	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.20	39.811	0.29	416.869	2.57	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.22	45.709	0.77	478.630	1.92	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.24	52.481	1.53	549.541	1.37	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.26	60.256	2.57	630.957	0.95	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.29	69.183	3.81	724.436	0.61	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.33	79.433	5.13	831.764	0.37	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.37	91.201	6.37	954.993	0.19	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.42	104.713	7.40	1096.478	0.08		
0.105	0.00	1.096	0.00	11.482	0.47	120.226	8.08	1258.925	0.00		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S129 - Average

SOP Name:

Measured:
Wednesday, January 21, 2009 8:24:14 PM

Sample Source & type:
Muttukaddu

Measured by:
Unknown

Analysed:
Wednesday, January 21, 2009 8:24:15 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
21.03 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.342 %

Result Emulation:
Off

Concentration:
0.2991 %Vol

Span :
1.840

Uniformity:
0.614

Result units:
Volume

Specific Surface Area:
0.0647 m²/g

Surface Weighted Mean D[3,2]:
92.775 um

Vol. Weighted Mean D[4,3]:
201.566 um

---

d(0.1): 77.519 um **d(0.5):** 158.594 um **d(0.9):** 369.320 um

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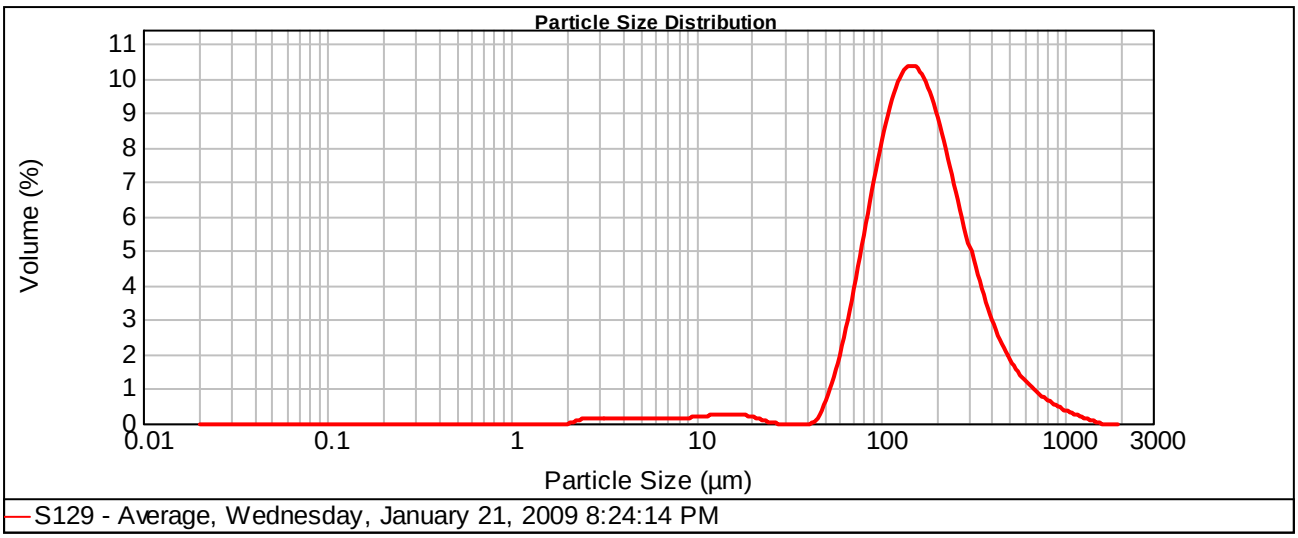


Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.22	120.226	9.07	1258.925	0.11
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.24	138.038	9.37	1445.440	0.01
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.24	158.489	9.12	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.21	181.970	8.39	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.14	208.930	7.34	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.04	239.883	6.12	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.10	26.303	0.00	275.423	4.90	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.12	30.200	0.00	316.228	3.78	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.13	34.674	0.00	363.078	2.85	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.14	39.811	0.01	416.869	2.12	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.14	45.709	0.47	478.630	1.58	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.13	52.481	1.29	549.541	1.18	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.12	60.256	2.46	630.957	0.88	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.12	69.183	3.90	724.436	0.66	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.12	79.433	5.48	831.764	0.47	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.13	91.201	6.99	954.993	0.33	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.15	104.713	8.25	1096.478	0.21		
0.105	0.00	1.096	0.00	11.482	0.18	120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S130 - Average

SOP Name:

Measured:
Wednesday, January 21, 2009 8:29:25 PM

Sample Source & type:
Muttukaddu

Measured by:
Unknown

Analysed:
Wednesday, January 21, 2009 8:29:27 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
17.98 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.548 %

Result Emulation:
Off

Concentration:
0.1079 %Vol

Span :
1.477

Uniformity:
0.582

Result units:
Volume

Specific Surface Area:
0.156 m²/g

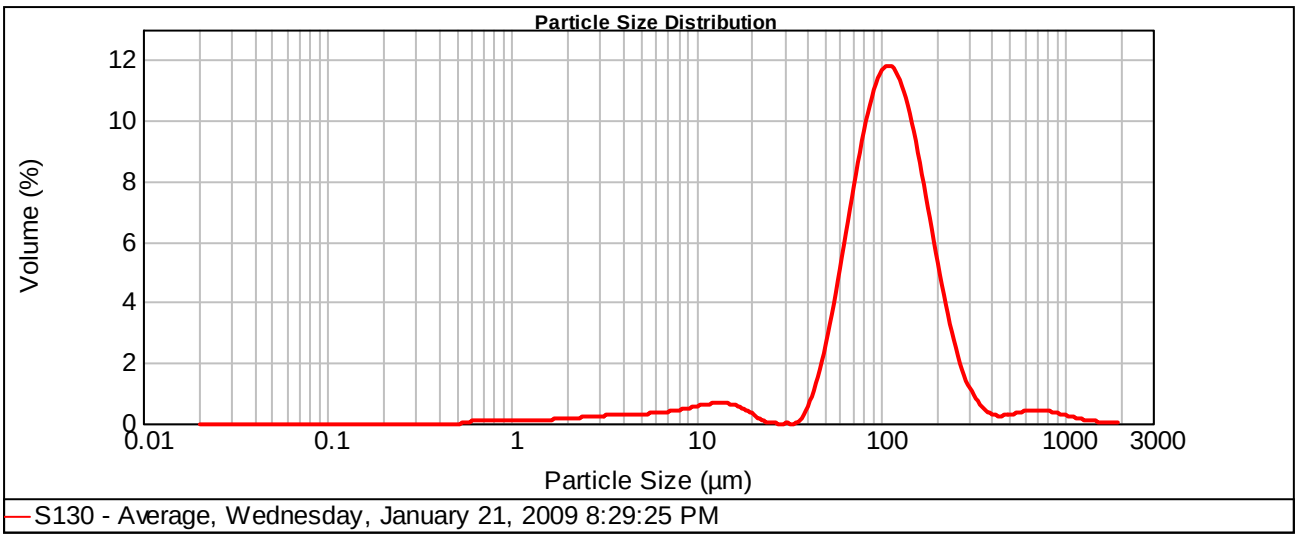
Surface Weighted Mean D[3,2]:
38.486 um

Vol. Weighted Mean D[4,3]:
133.614 um

---

d(0.1): 51.883 um **d(0.5):** 109.428 um **d(0.9):** 213.549 um

---



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.09	11.482	0.59	120.226	10.18	1258.925	0.09
0.011	0.00	0.120	0.00	1.259	0.10	13.183	0.61	138.038	9.00	1445.440	0.04
0.013	0.00	0.138	0.00	1.445	0.11	15.136	0.55	158.489	7.36	1659.587	0.02
0.015	0.00	0.158	0.00	1.660	0.12	17.378	0.42	181.970	5.50	1905.461	0.01
0.017	0.00	0.182	0.00	1.905	0.15	19.953	0.21	208.930	3.76	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.18	22.909	0.03	239.883	2.30	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.21	26.303	0.00	275.423	1.25	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.23	30.200	-0.00	316.228	0.60	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.25	34.674	0.14	363.078	0.30	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.27	39.811	0.90	416.869	0.23	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.28	45.709	2.09	478.630	0.28	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.29	52.481	3.71	549.541	0.35	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.31	60.256	5.61	630.957	0.39	6606.934	0.00
0.060	0.00	0.631	0.05	6.607	0.35	69.183	7.54	724.436	0.38	7585.776	0.00
0.069	0.00	0.724	0.07	7.586	0.40	79.433	9.21	831.764	0.32	8709.636	0.00
0.079	0.00	0.832	0.08	8.710	0.47	91.201	10.30	954.993	0.24	10000.000	0.00
0.091	0.00	0.955	0.08	10.000	0.54	104.713	10.65	1096.478	0.15		
0.105	0.00	1.096	0.09	11.482	0.54	120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S131 - Average

SOP Name:

Measured:
Wednesday, January 28, 2009 9:29:50 PM

Sample Source & type:
Muttukaddu

Measured by:
JohnstonP

Analysed:
Wednesday, January 28, 2009 9:29:51 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
20.23 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.754 %

Result Emulation:
Off

Concentration:
0.7444 %Vol

Span :
1.476

Uniformity:
0.458

Result units:
Volume

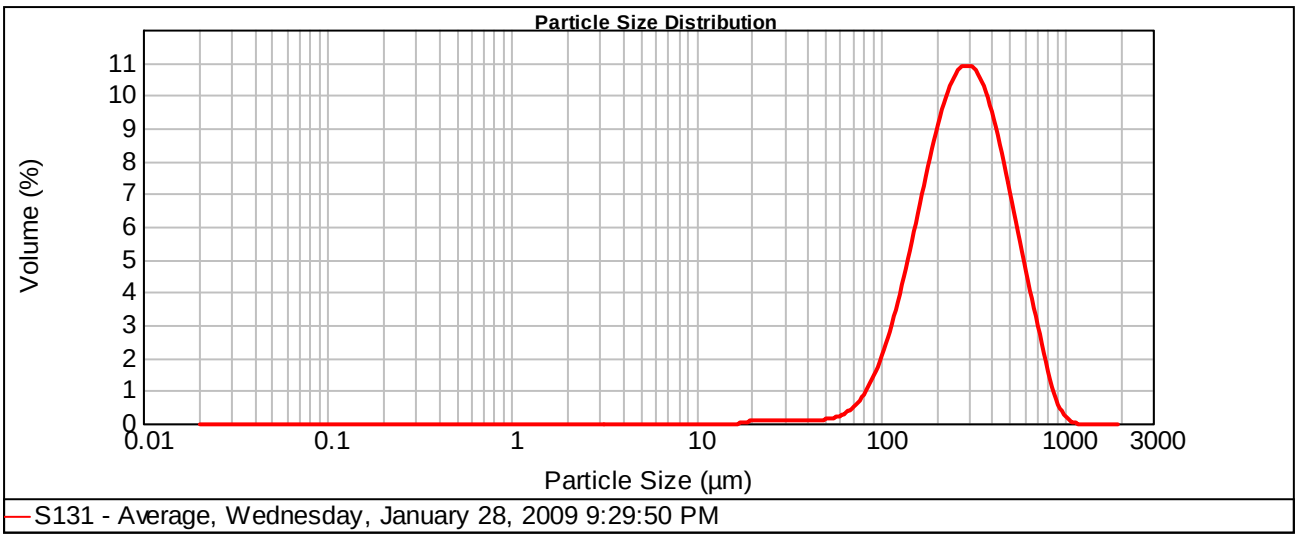
Specific Surface Area:
0.0258 m²/g

Surface Weighted Mean D[3,2]:
232.425 um

Vol. Weighted Mean D[4,3]:
319.038 um

d(0.1): 136.356 um **d(0.5):** 284.047 um **d(0.9):** 555.516 um

---



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	3.63	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	4.95	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	6.35	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.03	181.970	7.71	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.07	208.930	8.83	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.08	239.883	9.59	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.09	275.423	9.85	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.10	316.228	9.55	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.09	363.078	8.75	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.09	416.869	7.54	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.10	478.630	6.09	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.16	549.541	4.58	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.29	630.957	3.17	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.54	724.436	1.82	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.97	831.764	0.67	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	1.61	954.993	0.17	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	2.51	1096.478	0.00		
0.105	0.00	1.096	0.00	11.482	0.00	120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S132 - Average

Sample Source & type:
Muttukaddu

Sample bulk lot ref:
Pit1

SOP Name:

Measured by:
JohnstonP

Result Source:
Averaged

Measured:
Wednesday, January 28, 2009 9:37:46 PM

Analysed:
Wednesday, January 28, 2009 9:37:47 PM

Particle Name:
Default

Particle RI:
1.520

Dispersant Name:
Water

Accessory Name:
Hydro 2000G (A)

Absorption:
0.1

Dispersant RI:
1.330

Analysis model:
General purpose

Size range:
0.020 to 2000.000 um

Weighted Residual:
0.506 %

Sensitivity:
Normal

Obscuration:
18.42 %

Result Emulation:
Off

Concentration:
0.1032 %Vol

Span :
2.237

Uniformity:
0.693

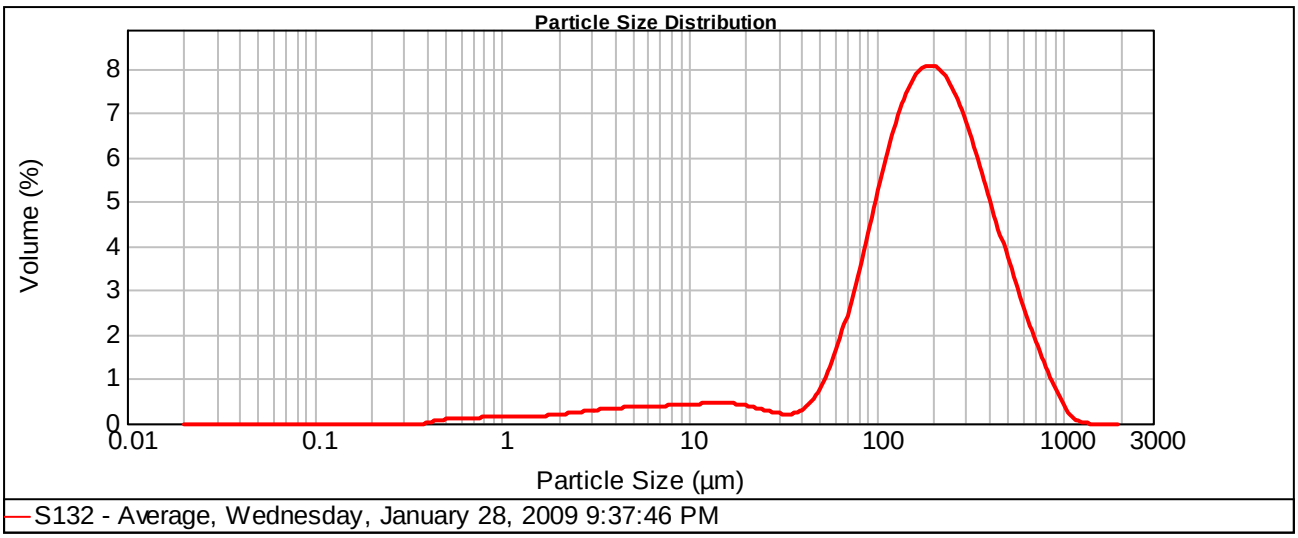
Result units:
Volume

Specific Surface Area:
0.181 m²/g

Surface Weighted Mean D[3,2]:
33.169 um

Vol. Weighted Mean D[4,3]:
235.648 um

d(0.1): 58.516 um **d(0.5):** 189.078 um **d(0.9):** 481.515 um



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.13	11.482	0.41	120.226	6.17	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.14	13.183	0.42	138.038	6.79	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.15	15.136	0.41	158.489	7.17	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.16	17.378	0.39	181.970	7.29	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.18	19.953	0.35	208.930	7.16	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.21	22.909	0.29	239.883	6.79	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.24	26.303	0.23	275.423	6.25	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.27	30.200	0.19	316.228	5.56	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.29	34.674	0.22	363.078	4.80	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.31	39.811	0.35	416.869	4.02	4365.158	0.00
0.040	0.00	0.417	0.06	4.365	0.33	45.709	0.63	478.630	3.25	5011.872	0.00
0.046	0.00	0.479	0.08	5.012	0.34	52.481	1.09	549.541	2.54	5754.399	0.00
0.052	0.00	0.550	0.10	5.754	0.35	60.256	1.74	630.957	1.89	6606.934	0.00
0.060	0.00	0.631	0.11	6.607	0.36	69.183	2.55	724.436	1.30	7585.776	0.00
0.069	0.00	0.724	0.12	7.586	0.36	79.433	3.48	831.764	0.78	8709.636	0.00
0.079	0.00	0.832	0.12	8.710	0.38	91.201	4.44	954.993	0.33	10000.000	0.00
0.091	0.00	0.955	0.13	10.000	0.39	104.713	5.37	1096.478	0.07		
0.105	0.00	1.096	0.13	11.482	0.39	120.226	5.37	1258.925	0.07		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S133 - Average

SOP Name:

Measured:
Wednesday, January 21, 2009 8:46:18 PM

Sample Source & type:
Vailanganni

Measured by:
Unknown

Analysed:
Wednesday, January 21, 2009 8:46:19 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
24.74 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.438 %

Result Emulation:
Off

Concentration:
0.6130 %Vol

Span :
1.146

Uniformity:
0.36

Result units:
Volume

Specific Surface Area:
0.0393 m²/g

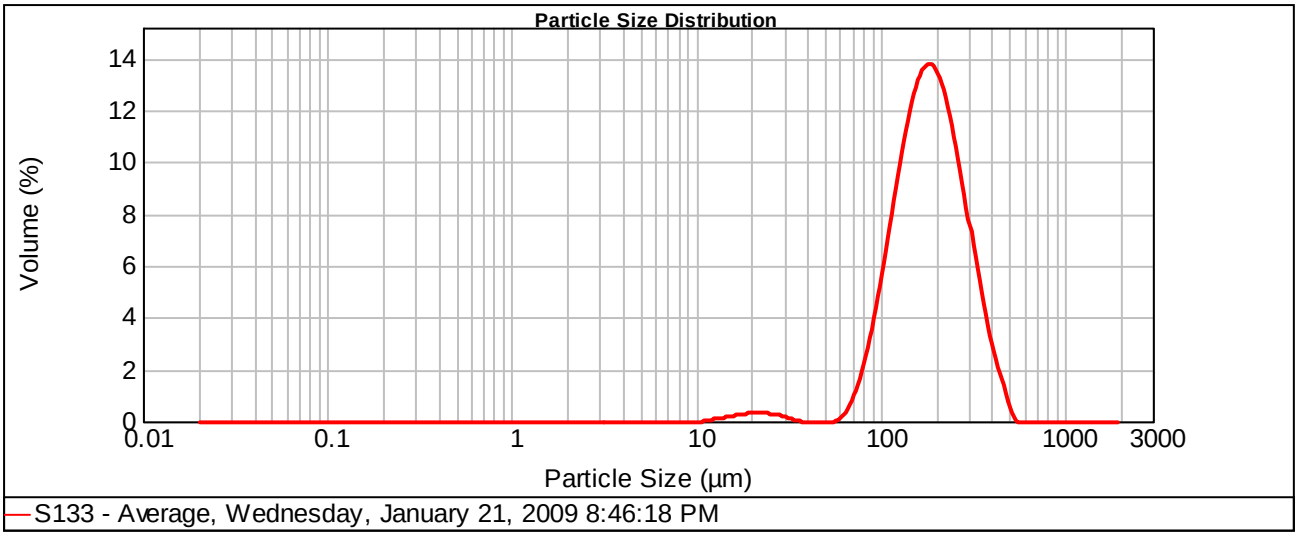
Surface Weighted Mean D[3,2]:
152.725 um

Vol. Weighted Mean D[4,3]:
198.006 um

---

d(0.1): 104.687 um **d(0.5):** 183.617 um **d(0.9):** 315.120 um

---



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.06	120.226	9.09	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.13	138.038	11.07	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.20	158.489	12.25	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.27	181.970	12.41	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.30	208.930	11.49	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.28	239.883	9.68	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.21	275.423	7.40	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.08	316.228	5.04	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	2.97	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	1.56	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	0.26	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	0.00	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	0.00	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.32	724.436	0.00	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	1.16	831.764	0.00	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	2.54	954.993	0.00	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	4.45	1096.478	0.00		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	6.76	1258.925	0.00		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S134 - Average

SOP Name:

Measured:
Wednesday, January 21, 2009 8:51:41 PM

Sample Source & type:
Vailanganni

Measured by:
Unknown

Analysed:
Wednesday, January 21, 2009 8:51:42 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
21.48 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.461 %

Result Emulation:
Off

Concentration:
0.7959 %Vol

Span :
1.899

Uniformity:
0.586

Result units:
Volume

Specific Surface Area:
0.0259 m²/g

Surface Weighted Mean D[3,2]:
231.947 um

Vol. Weighted Mean D[4,3]:
364.439 um

d(0.1): 135.390 um **d(0.5):** 296.310 um **d(0.9):** 698.126 um

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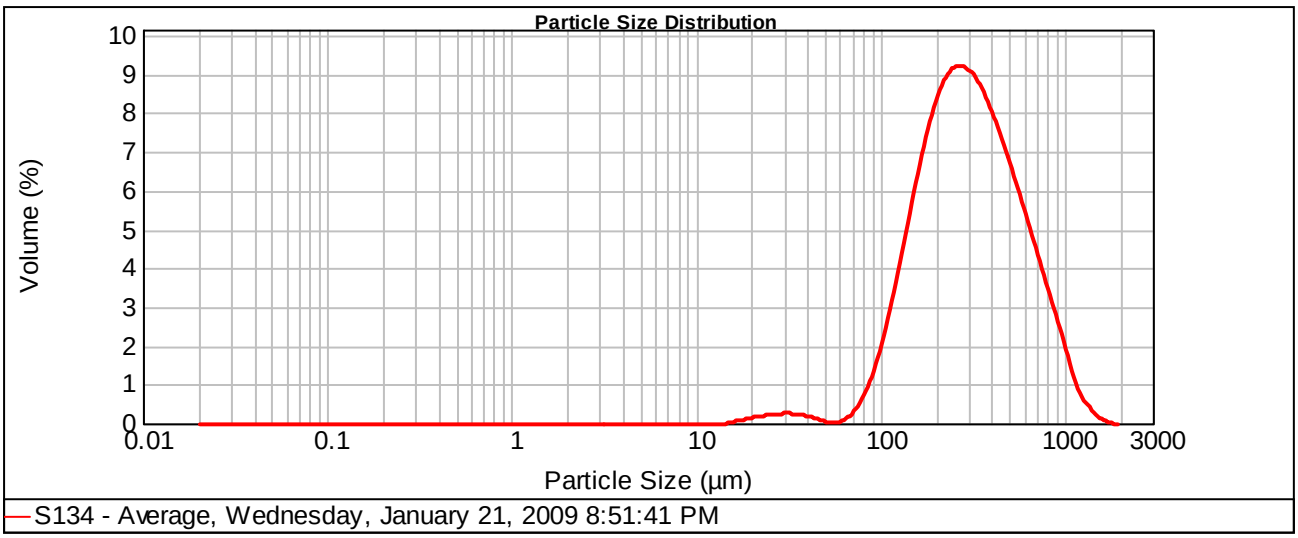


Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	3.79	1258.925	0.41
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	5.09	1445.440	0.14
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.04	158.489	6.29	1659.587	0.02
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.10	181.970	7.31	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.15	208.930	7.99	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.19	239.883	8.31	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.23	275.423	8.26	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.23	316.228	7.92	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.20	363.078	7.36	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.13	416.869	6.67	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.05	478.630	5.91	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.02	549.541	5.09	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.11	630.957	4.24	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.36	724.436	3.37	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.84	831.764	2.53	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	1.58	954.993	1.67	10000.000	
0.091	0.00	0.955	0.00	10.000	0.00	104.713	2.60	1096.478	0.81		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S135 - Average

SOP Name:

Measured:
Wednesday, January 21, 2009 9:12:59 PM

Sample Source & type:
Vailanganni

Measured by:
Unknown

Analysed:
Wednesday, January 21, 2009 9:13:00 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
17.81 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.518 %

Result Emulation:
Off

Concentration:
0.4160 %Vol

Span :
1.087

Uniformity:
0.344

Result units:
Volume

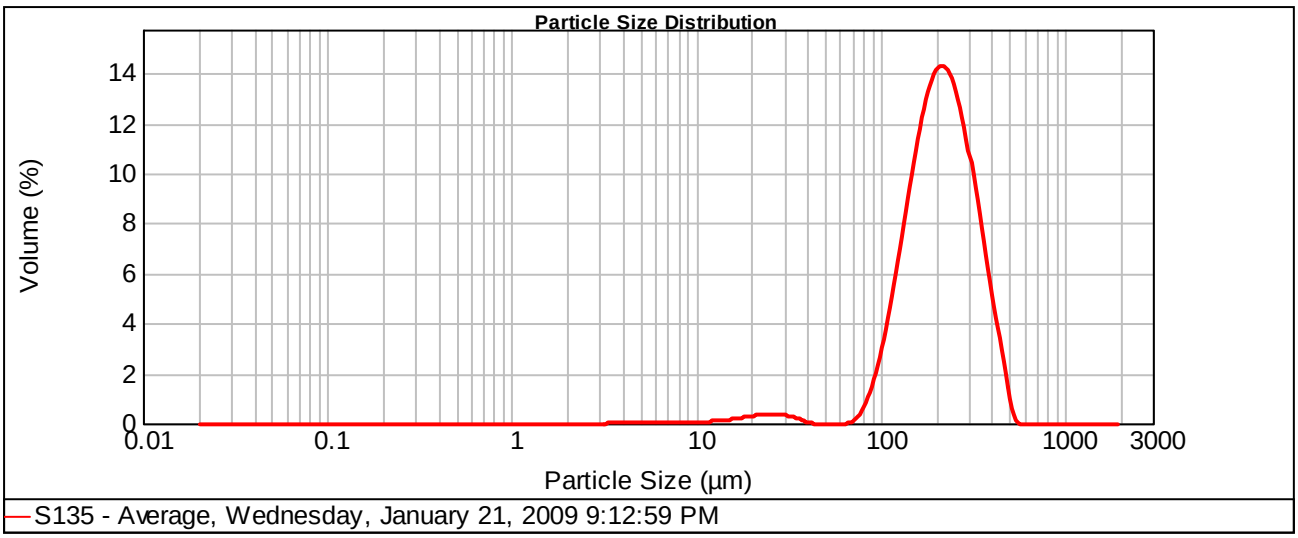
Specific Surface Area:
0.04 m²/g

Surface Weighted Mean D[3,2]:
150.000 um

Vol. Weighted Mean D[4,3]:
223.977 um

---

d(0.1): 121.073 um **d(0.5):** 211.823 um **d(0.9):** 351.298 um



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.07	120.226	6.42	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.11	138.038	8.92	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.16	158.489	11.09	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.23	181.970	12.54	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.29	208.930	12.90	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.33	239.883	12.06	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.32	275.423	10.21	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.26	316.228	7.72	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.03	34.674	0.12	363.078	5.07	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.06	39.811	0.00	416.869	2.83	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.07	45.709	0.00	478.630	0.51	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.07	52.481	0.00	549.541	0.00	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.07	60.256	0.00	630.957	0.00	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.07	69.183	0.00	724.436	0.00	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.06	79.433	0.18	831.764	0.00	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.05	91.201	0.90	954.993	0.00	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.04	104.713	2.19	1096.478	0.00		
0.105	0.00	1.096	0.00	11.482	0.04	120.226	4.09	1258.925	0.00		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S136 - Average

SOP Name:

Measured:
Wednesday, January 28, 2009 9:48:38 PM

Sample Source & type:
Vailanganni

Measured by:
JohnstonP

Analysed:
Wednesday, January 28, 2009 9:48:39 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
17.70 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.570 %

Result Emulation:
Off

Concentration:
0.1911 %Vol

Span :
1.237

Uniformity:
0.397

Result units:
Volume

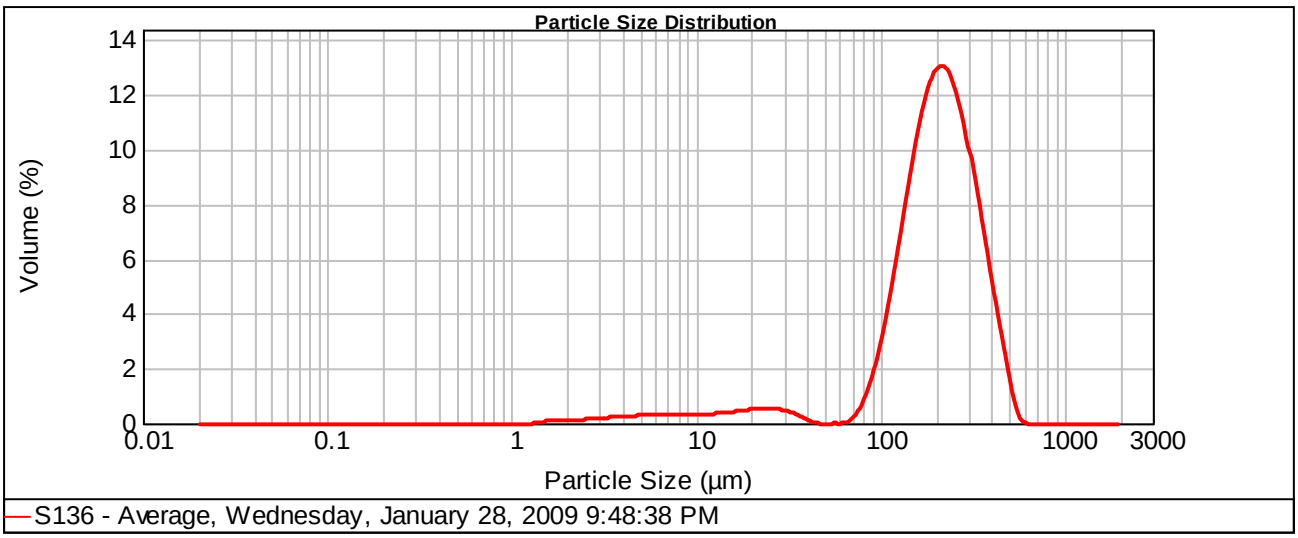
Specific Surface Area:
0.0815 m²/g

Surface Weighted Mean D[3,2]:
73.609 um

Vol. Weighted Mean D[4,3]:
216.102 um

d(0.1): 102.350 um **d(0.5):** 205.887 um **d(0.9):** 356.973 um

---



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.32	120.226	6.26	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.01	13.183	0.35	138.038	8.47	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.07	15.136	0.39	158.489	10.34	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.08	17.378	0.44	181.970	11.54	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.10	19.953	0.48	208.930	11.78	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.12	22.909	0.50	239.883	11.01	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.15	26.303	0.46	275.423	9.43	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.18	30.200	0.38	316.228	7.30	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.21	34.674	0.22	363.078	5.08	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.23	39.811	0.03	416.869	3.02	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.26	45.709	0.00	478.630	1.07	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.28	52.481	0.00	549.541	0.04	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.29	60.256	0.02	630.957	0.00	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.29	69.183	0.34	724.436	0.00	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.29	79.433	1.10	831.764	0.00	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.29	91.201	2.36	954.993	0.00	10000.000	
0.091	0.00	0.955	0.00	10.000	0.30	104.713	4.14	1096.478	0.00		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S137 - Average

SOP Name:

Measured:
Wednesday, January 28, 2009 9:56:27 PM

Sample Source & type:
Vailanganni

Measured by:
JohnstonP

Analysed:
Wednesday, January 28, 2009 9:56:28 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
17.72 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.613 %

Result Emulation:
Off

Concentration:
0.2462 %Vol

Span :
1.177

Uniformity:
0.372

Result units:
Volume

Specific Surface Area:
0.0636 m²/g

Surface Weighted Mean D[3,2]:
94.363 um

Vol. Weighted Mean D[4,3]:
235.449 um

---

d(0.1): 119.642 um **d(0.5):** 222.159 um **d(0.9):** 381.167 um

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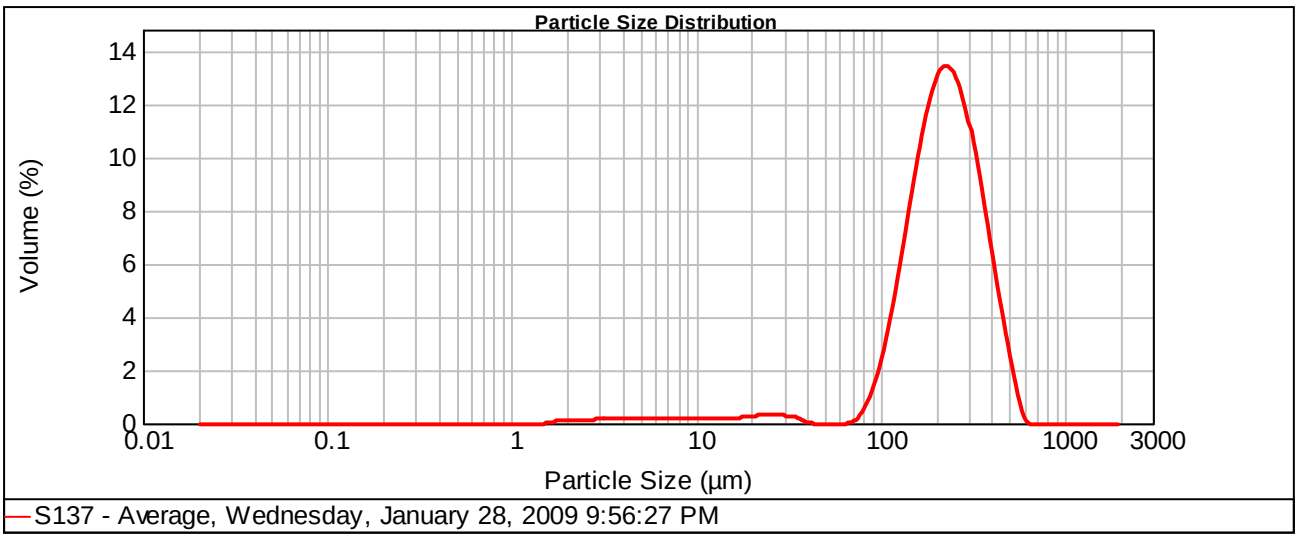

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.14	120.226	5.47	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.15	138.038	7.75	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.01	15.136	0.18	158.489	9.84	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.08	17.378	0.22	181.970	11.42	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.09	19.953	0.26	208.930	12.11	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.11	22.909	0.29	239.883	11.79	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.13	26.303	0.29	275.423	10.50	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.15	30.200	0.24	316.228	8.50	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.17	34.674	0.13	363.078	6.20	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.18	39.811	0.00	416.869	3.96	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.19	45.709	0.00	478.630	1.96	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.20	52.481	0.00	549.541	0.32	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.19	60.256	0.00	630.957	0.00	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.18	69.183	0.15	724.436	0.00	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.17	79.433	0.74	831.764	0.00	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.15	91.201	1.81	954.993	0.00	10000.000	
0.091	0.00	0.955	0.00	10.000	0.14	104.713	3.43	1096.478	0.00		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S138 - Average

SOP Name:

Measured:
Thursday, July 09, 2009 2:26:57 PM

Sample Source & type:
Vailanganni

Measured by:
JohnstonP

Analysed:
Thursday, July 09, 2009 2:26:59 PM

Sample bulk lot ref:

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
18.28 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.704 %

Result Emulation:
Off

Concentration:
0.2925 %Vol

Span :
1.176

Uniformity:
0.372

Result units:
Volume

Specific Surface Area:
0.0564 m²/g

Surface Weighted Mean D[3,2]:
106.454 um

Vol. Weighted Mean D[4,3]:
234.277 um

---

d(0.1): 118.934 um **d(0.5):** 221.318 um **d(0.9):** 379.241 um

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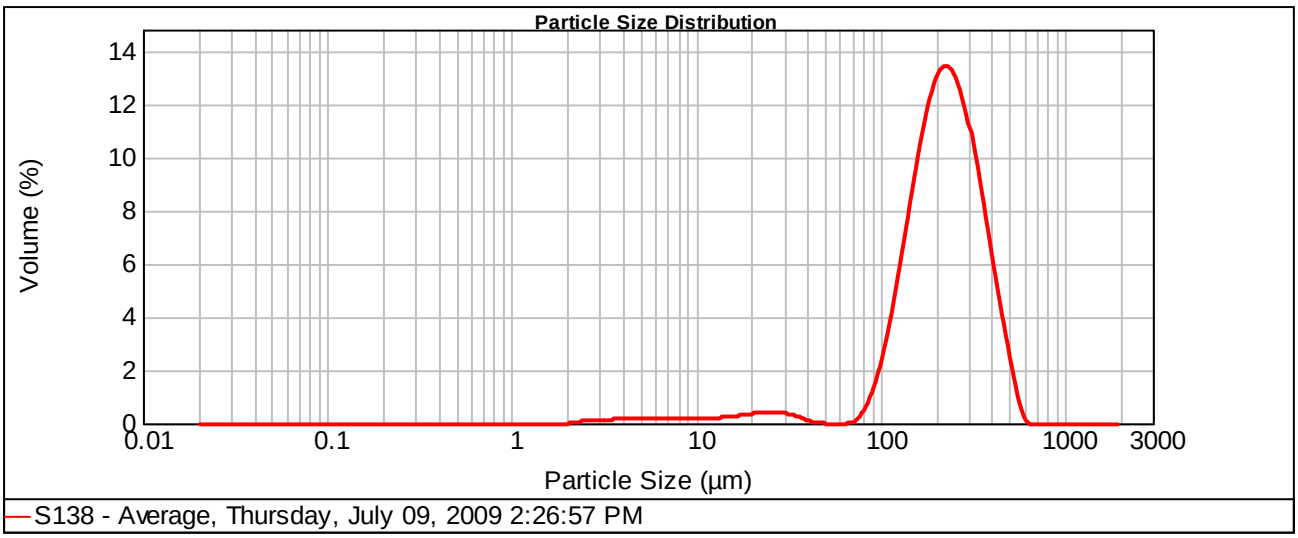


Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.18	120.226	5.47	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.21	138.038	7.77	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.25	158.489	9.89	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.30	181.970	11.48	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.35	208.930	12.16	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.07	22.909	0.38	239.883	11.79	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.10	26.303	0.37	275.423	10.47	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.12	30.200	0.31	316.228	8.44	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.13	34.674	0.19	363.078	6.12	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.15	39.811	0.05	416.869	3.88	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.17	45.709	0.00	478.630	1.89	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.18	52.481	0.00	549.541	0.30	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.18	60.256	0.00	630.957	0.00	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.18	69.183	0.00	724.436	0.00	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.18	79.433	0.13	831.764	0.00	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.17	91.201	0.69	954.993	0.00	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.17	104.713	1.77	1096.478	0.00		
0.105	0.00	1.096	0.00	11.482	0.17	120.226	3.40	1258.925	0.00		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S139 - Average

SOP Name:

Measured:
Wednesday, January 28, 2009 9:21:24 PM

Sample Source & type:
Vailanganni

Measured by:
JohnstonP

Analysed:
Wednesday, January 28, 2009 9:21:25 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
18.29 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.609 %

Result Emulation:
Off

Concentration:
0.0659 %Vol

Span :
1.824

Uniformity:
0.493

Result units:
Volume

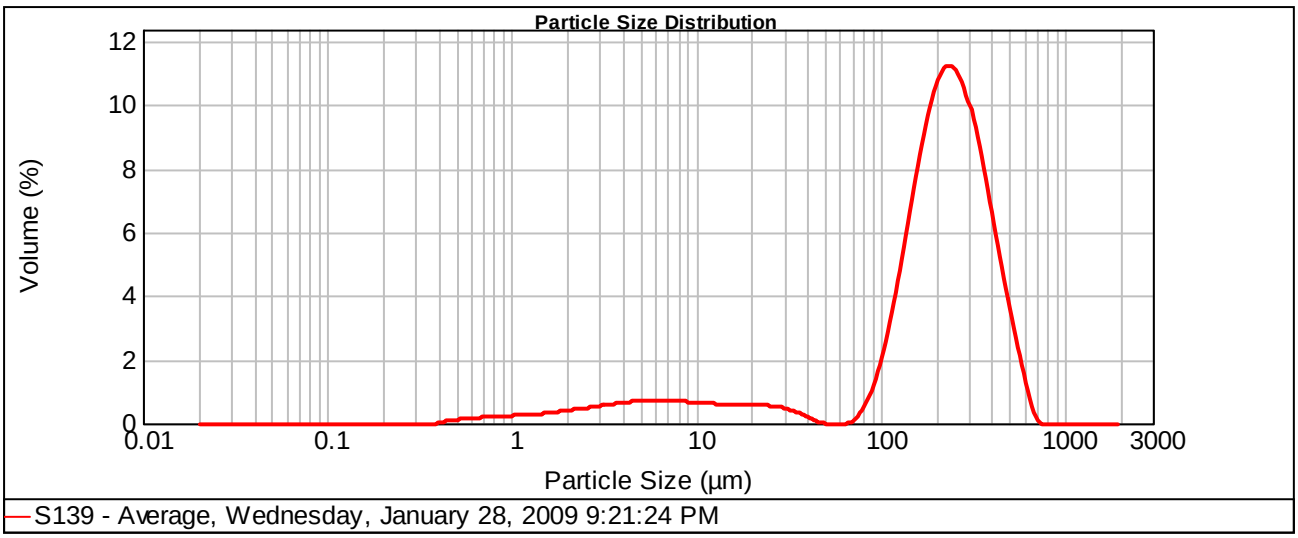
Specific Surface Area:
0.275 m²/g

Surface Weighted Mean D[3,2]:
21.802 um

Vol. Weighted Mean D[4,3]:
226.891 um

---

d(0.1): 12.958 um **d(0.5):** 217.540 um **d(0.9):** 409.680 um



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.24	11.482	0.56	120.226	4.44	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.26	13.183	0.54	138.038	6.27	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.29	15.136	0.54	158.489	7.99	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.32	17.378	0.53	181.970	9.35	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.37	19.953	0.53	208.930	10.07	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.41	22.909	0.51	239.883	10.04	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.46	26.303	0.46	275.423	9.28	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.51	30.200	0.38	316.228	7.93	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.56	34.674	0.26	363.078	6.27	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.59	39.811	0.11	416.869	4.54	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.62	45.709	0.00	478.630	2.95	5011.872	0.00
0.046	0.00	0.479	0.07	5.012	0.64	52.481	0.00	549.541	1.52	5754.399	0.00
0.052	0.00	0.550	0.11	5.754	0.65	60.256	0.00	630.957	0.31	6606.934	0.00
0.060	0.00	0.631	0.14	6.607	0.64	69.183	0.16	724.436	0.00	7585.776	0.00
0.069	0.00	0.724	0.17	7.586	0.63	79.433	0.66	831.764	0.00	8709.636	0.00
0.079	0.00	0.832	0.19	8.710	0.61	91.201	1.52	954.993	0.00	10000.000	0.00
0.091	0.00	0.955	0.21	10.000	0.58	104.713	2.81	1096.478	0.00		
0.105	0.00	1.096	0.22	11.482	0.58	120.226	2.81	1258.925	0.00		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S140 - Average

Sample Source & type:
Vailanganni

Sample bulk lot ref:
Pit1

SOP Name:

Measured by:
JohnstonP

Result Source:
Averaged

Measured:
Wednesday, January 28, 2009 10:04:34 PM

Analysed:
Wednesday, January 28, 2009 10:04:35 PM

Particle Name:
Default

Particle RI:
1.520

Dispersant Name:
Water

Accessory Name:
Hydro 2000G (A)

Absorption:
0.1

Dispersant RI:
1.330

Analysis model:
General purpose

Size range:
0.020 to 2000.000 um

Weighted Residual:
0.611 %

Sensitivity:
Normal

Obscuration:
19.76 %

Result Emulation:
Off

Concentration:
0.5573 %Vol

Span :
1.397

Uniformity:
0.434

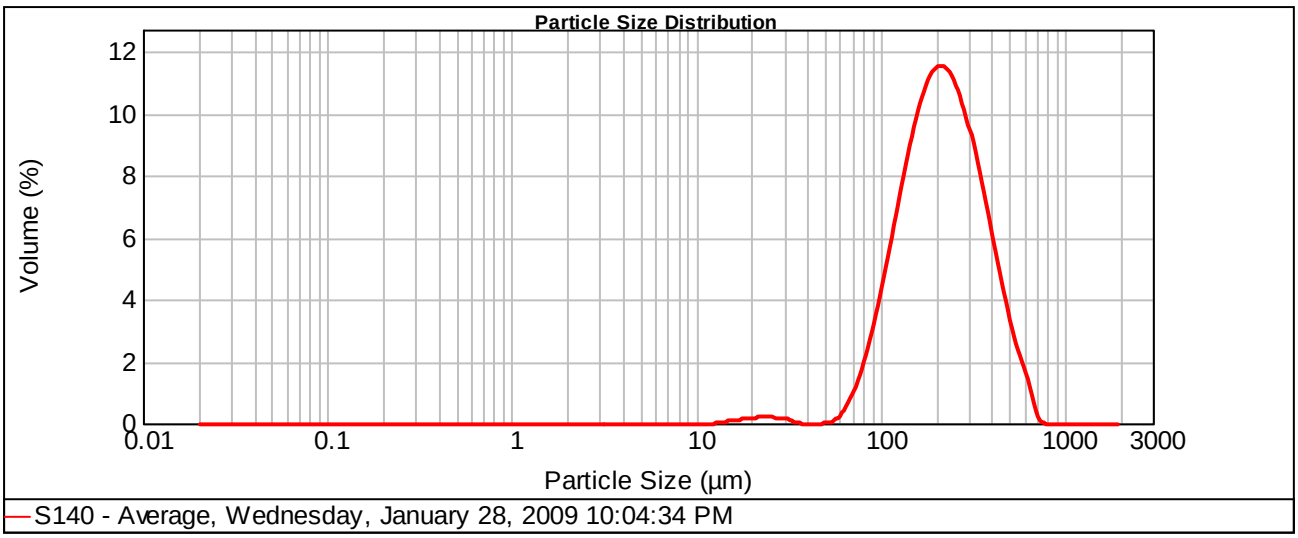
Result units:
Volume

Specific Surface Area:
0.0335 m²/g

Surface Weighted Mean D[3,2]:
179.071 um

Vol. Weighted Mean D[4,3]:
239.705 um

d(0.1): 110.429 um **d(0.5):** 213.873 um **d(0.9):** 409.131 um



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	6.75	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.04	138.038	8.32	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.09	158.489	9.54	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.13	181.970	10.28	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.17	208.930	10.41	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.18	239.883	9.91	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.16	275.423	8.87	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.08	316.228	7.44	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	5.83	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	4.23	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	2.77	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.09	549.541	1.72	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.47	630.957	0.58	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	1.15	724.436	0.00	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	2.17	831.764	0.00	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	3.51	954.993	0.00	10000.000	
0.091	0.00	0.955	0.00	10.000	0.00	104.713	5.10	1096.478	0.00		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S141 - Average

SOP Name:

Measured:
Wednesday, January 28, 2009 10:15:29 PM

Sample Source & type:
Vailanganni

Measured by:
JohnstonP

Analysed:
Wednesday, January 28, 2009 10:15:30 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
16.38 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.627 %

Result Emulation:
Off

Concentration:
0.3615 %Vol

Span :
1.126

Uniformity:
0.355

Result units:
Volume

Specific Surface Area:
0.0421 m²/g

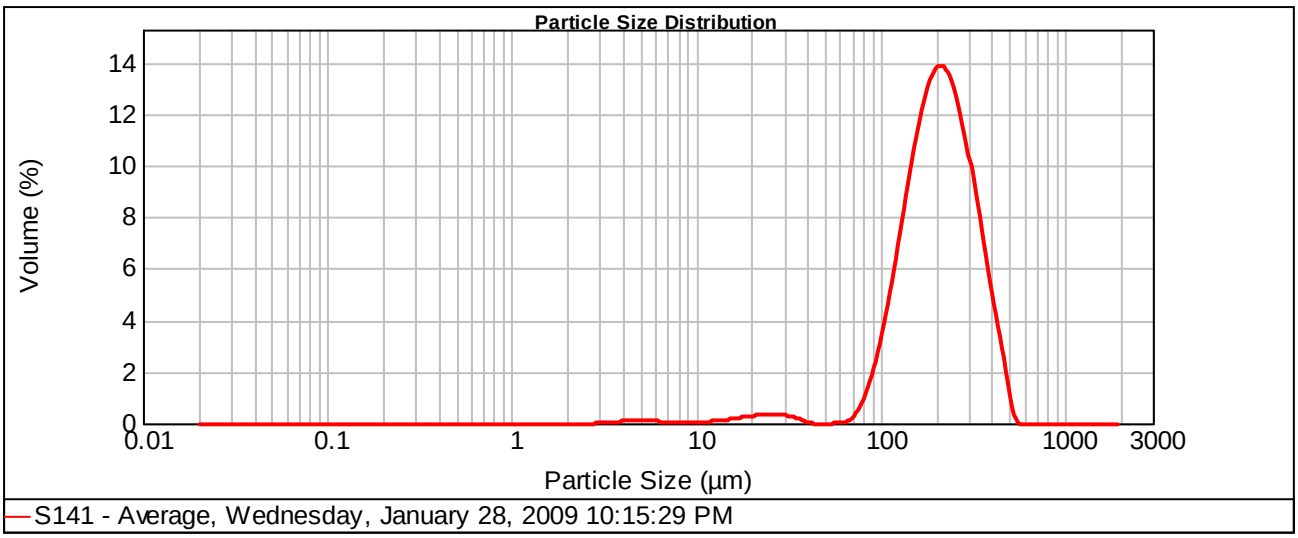
Surface Weighted Mean D[3,2]:
142.493 um

Vol. Weighted Mean D[4,3]:
220.809 um

---

d(0.1): 116.595 um **d(0.5):** 207.912 um **d(0.9):** 350.623 um

---



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.07	120.226	6.76	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.11	138.038	9.11	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.16	158.489	11.08	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.23	181.970	12.30	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.28	208.930	12.48	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.32	239.883	11.56	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.30	275.423	9.75	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.04	30.200	0.24	316.228	7.40	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.06	34.674	0.12	363.078	4.96	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.07	39.811	0.00	416.869	2.85	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.07	45.709	0.00	478.630	0.57	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.07	52.481	0.00	549.541	0.00	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.07	60.256	0.00	630.957	0.00	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.07	69.183	0.04	724.436	0.00	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.06	79.433	0.40	831.764	0.00	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.05	91.201	1.23	954.993	0.00	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.04	104.713	2.58	1096.478	0.00		
0.105	0.00	1.096	0.00	11.482	0.04	120.226	4.50	1258.925	0.00		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S142 - Average

SOP Name:

Measured:
Wednesday, January 28, 2009 10:24:44 PM

Sample Source & type:
Vailanganni

Measured by:
JohnstonP

Analysed:
Wednesday, January 28, 2009 10:24:46 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
20.35 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.467 %

Result Emulation:
Off

Concentration:
0.2035 %Vol

Span :
1.566

Uniformity:
0.489

Result units:
Volume

Specific Surface Area:
0.0897 m²/g

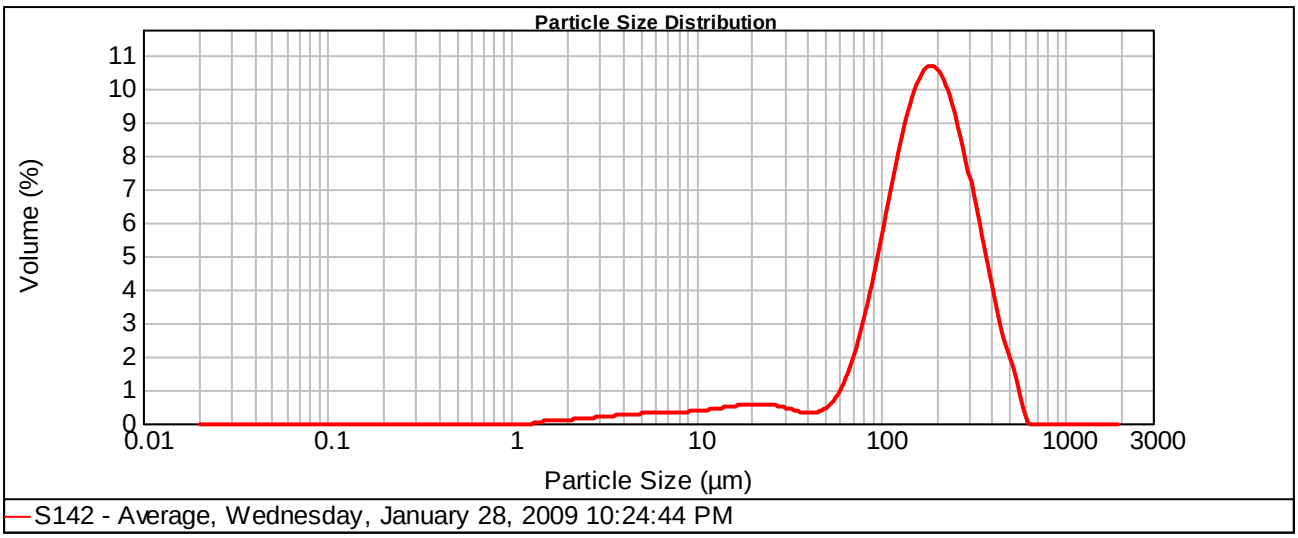
Surface Weighted Mean D[3,2]:
66.890 um

Vol. Weighted Mean D[4,3]:
194.883 um

---

d(0.1): 70.613 um **d(0.5):** 177.551 um **d(0.9):** 348.618 um

---



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.38	120.226	7.58	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.01	13.183	0.43	138.038	8.76	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.07	15.136	0.47	158.489	9.49	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.08	17.378	0.51	181.970	9.67	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.10	19.953	0.53	208.930	9.26	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.12	22.909	0.51	239.883	8.32	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.15	26.303	0.46	275.423	7.01	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.18	30.200	0.38	316.228	5.47	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.21	34.674	0.30	363.078	3.97	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.24	39.811	0.28	416.869	2.56	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.26	45.709	0.37	478.630	1.62	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.27	52.481	0.66	549.541	0.40	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.29	60.256	1.22	630.957	0.00	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.30	69.183	2.09	724.436	0.00	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.31	79.433	3.25	831.764	0.00	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.32	91.201	4.65	954.993	0.00	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.35	104.713	6.16	1096.478	0.00		
0.105	0.00	1.096	0.00	11.482	0.35	120.226	6.16	1258.925	0.00		

Operator notes: *NOTE: Pits 1,2 and 3 are all in this one document. (140-141 = pit2) (142+ = pit3)*

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S143 - Average

SOP Name:

Measured:
Wednesday, January 28, 2009 10:37:31 PM

Sample Source & type:
Vailanganni

Measured by:
JohnstonP

Analysed:
Wednesday, January 28, 2009 10:37:32 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
19.44 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.527 %

Result Emulation:
Off

Concentration:
0.2707 %Vol

Span :
1.153

Uniformity:
0.369

Result units:
Volume

Specific Surface Area:
0.0644 m²/g

Surface Weighted Mean D[3,2]:
93.109 um

Vol. Weighted Mean D[4,3]:
217.158 um

d(0.1): 112.090 um **d(0.5):** 205.703 um **d(0.9):** 349.255 um

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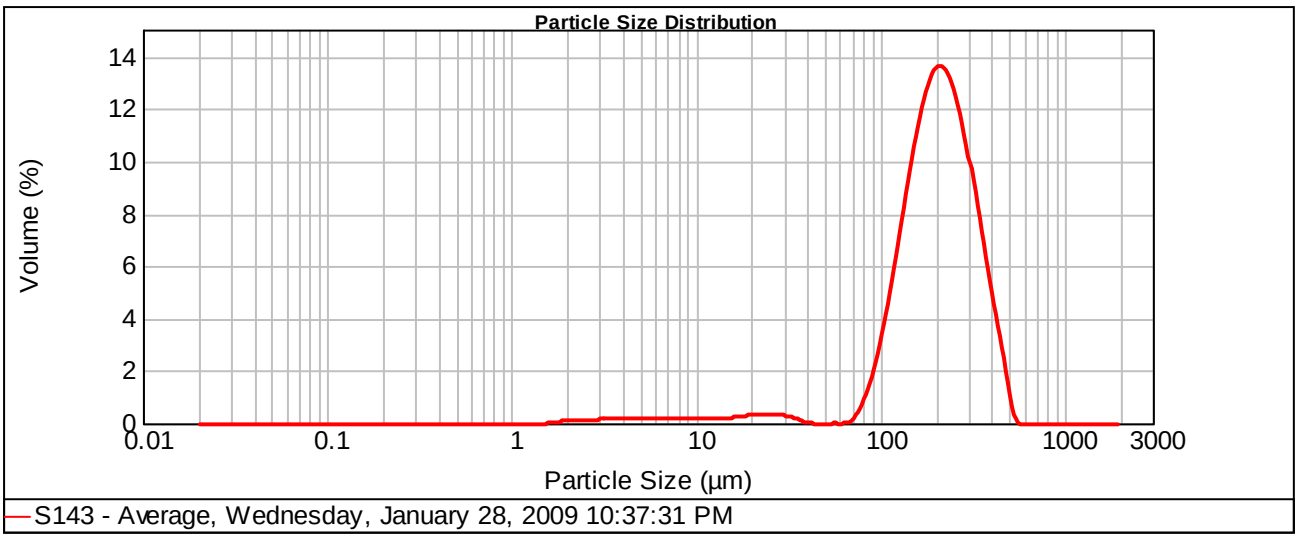

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.15	120.226	6.72	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.17	138.038	9.04	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.21	158.489	10.97	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.06	17.378	0.26	181.970	12.14	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.09	19.953	0.30	208.930	12.27	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.10	22.909	0.32	239.883	11.34	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.12	26.303	0.30	275.423	9.54	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.14	30.200	0.21	316.228	7.24	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.16	34.674	0.09	363.078	4.86	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.18	39.811	0.00	416.869	2.80	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.19	45.709	0.00	478.630	0.56	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.19	52.481	0.00	549.541	0.00	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.18	60.256	0.00	630.957	0.00	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.17	69.183	0.33	724.436	0.00	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.16	79.433	1.16	831.764	0.00	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.15	91.201	2.53	954.993	0.00	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.14	104.713	4.46	1096.478	0.00		
0.105	0.00	1.096	0.00	11.482	0.14	120.226	4.46	1258.925	0.00		

Operator notes: *NOTE: Pits 1,2 and 3 are all in this one document. (140-141 = pit2) (142+ = pit3)*

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S144 - Average

SOP Name:

Measured:
Wednesday, January 28, 2009 10:45:35 PM

Sample Source & type:
Vailanganni

Measured by:
JohnstonP

Analysed:
Wednesday, January 28, 2009 10:45:36 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
19.97 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.715 %

Result Emulation:
Off

Concentration:
0.6823 %Vol

Span :
1.094

Uniformity:
0.339

Result units:
Volume

Specific Surface Area:
0.0278 m²/g

Surface Weighted Mean D[3,2]:
215.783 um

Vol. Weighted Mean D[4,3]:
252.132 um

d(0.1): 137.984 um **d(0.5):** 234.208 um **d(0.9):** 394.212 um

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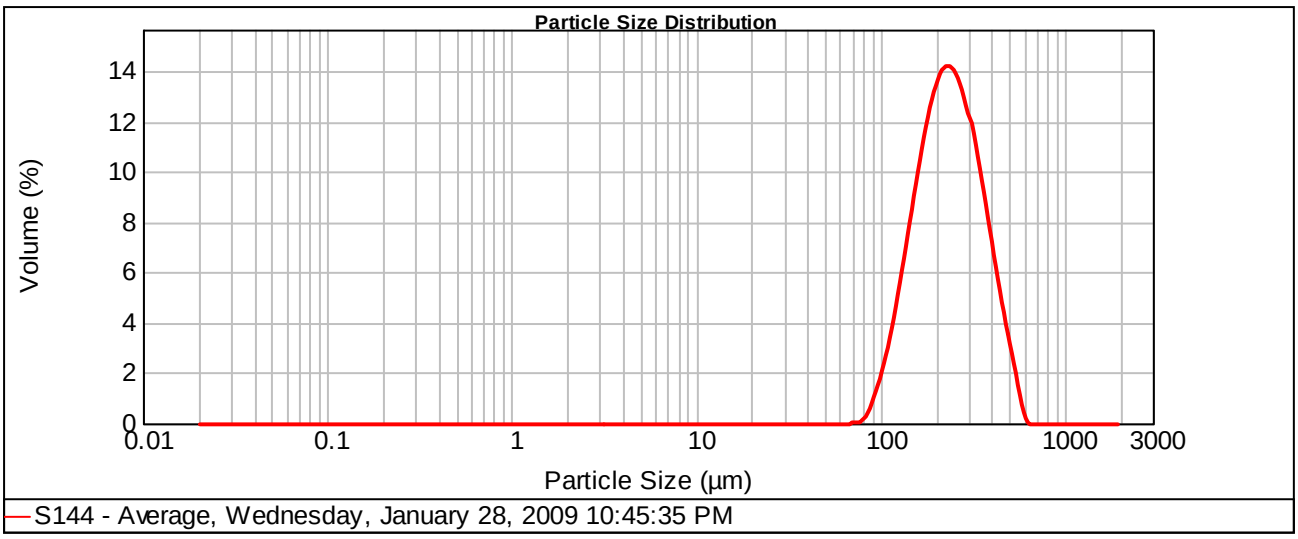

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	5.15	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	7.61	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	9.97	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	11.84	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	12.79	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	12.63	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	11.39	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	9.33	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	6.91	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	4.52	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	2.49	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	0.49	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	0.00	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	0.00	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.03	831.764	0.00	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.38	954.993	0.00	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	1.44	1096.478	0.00		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	3.02	1258.925	0.00		

Operator notes: *NOTE: Pits 1,2 and 3 are all in this one document. (140-141 = pit2) (142+ = pit3)*

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S145 - Average

SOP Name:

Measured:
Tuesday, October 21, 2008 10:12:35 PM

Sample Source & type:
Kallar

Measured by:
student

Analysed:
Tuesday, October 21, 2008 10:12:36 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
22.27 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.499 %

Result Emulation:
Off

Concentration:
0.7424 %Vol

Span :
1.049

Uniformity:
0.321

Result units:
Volume

Specific Surface Area:
0.0289 m²/g

Surface Weighted Mean D[3,2]:
207.682 um

Vol. Weighted Mean D[4,3]:
239.991 um

d(0.1): 134.500 um **d(0.5):** 224.307 um **d(0.9):** 369.878 um

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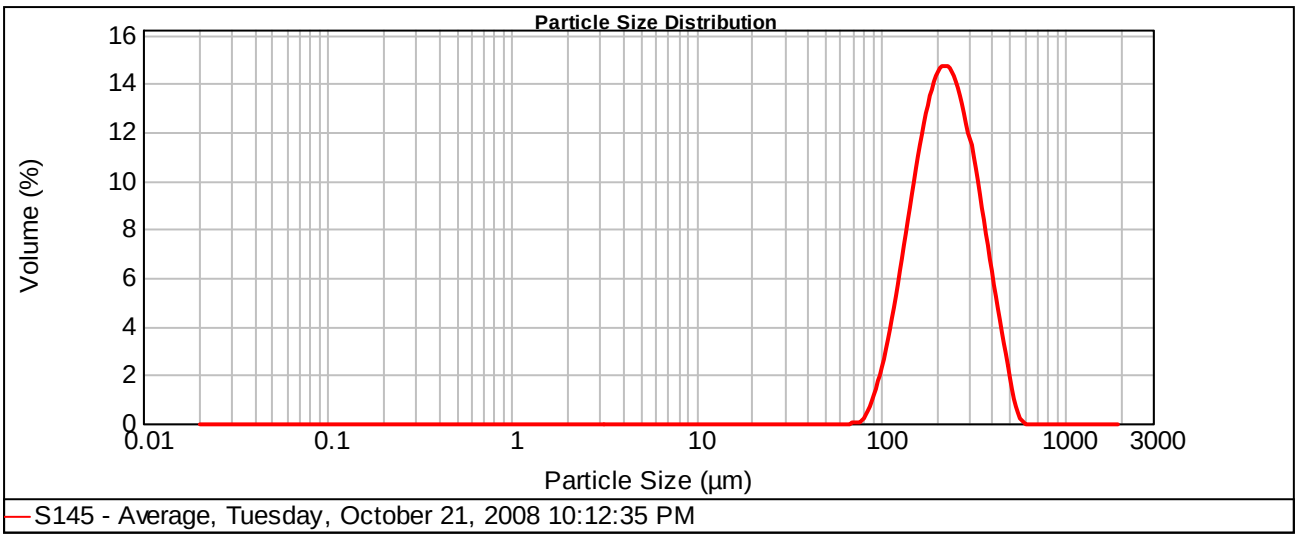

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	5.78	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	8.42	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	10.84	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	12.62	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	13.31	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	12.75	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	11.10	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	8.69	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	6.06	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	3.60	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	1.27	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	0.05	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	0.00	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.03	724.436	0.00	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.43	831.764	0.00	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	1.64	954.993	0.00	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	3.42	1096.478	0.00		
0.105	0.00	1.096	0.00	11.482	0.00	120.226		1258.925	0.00		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S146 - Average

SOP Name:

Measured:
Tuesday, October 21, 2008 10:26:09 PM

Sample Source & type:
Kallar

Measured by:
student

Analysed:
Tuesday, October 21, 2008 10:26:10 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
19.62 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.553 %

Result Emulation:
Off

Concentration:
0.7388 %Vol

Span :
1.020

Uniformity:
0.312

Result units:
Volume

Specific Surface Area:
0.0252 m²/g

Surface Weighted Mean D[3,2]:
238.250 um

Vol. Weighted Mean D[4,3]:
273.240 um

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d(0.1): 155.625 um **d(0.5):** 256.538 um **d(0.9):** 417.272 um

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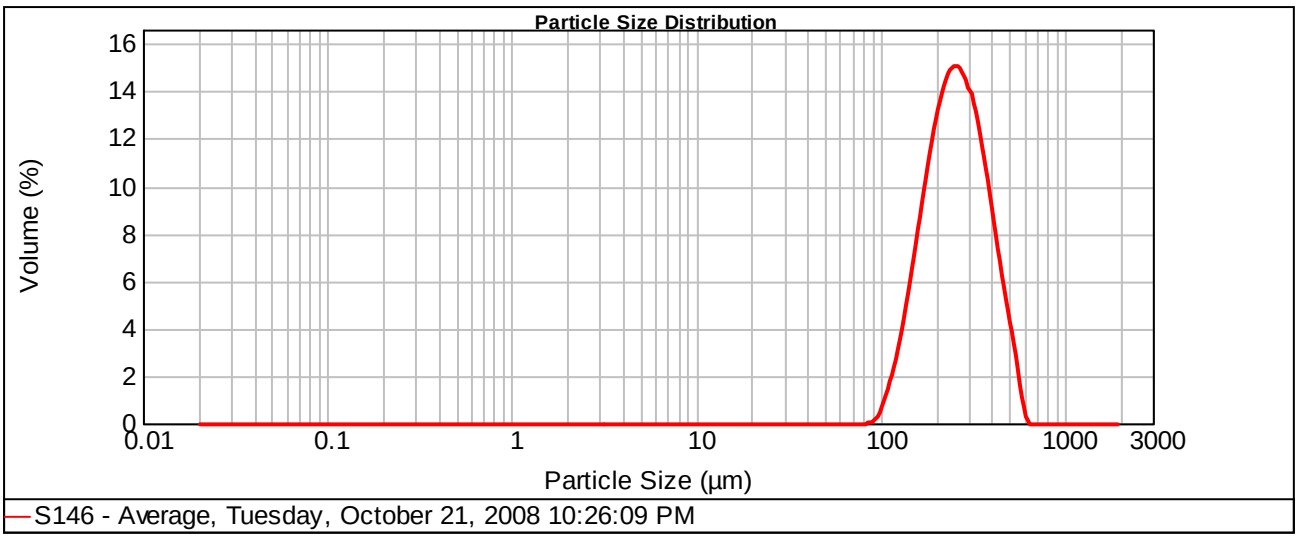


Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	3.30	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	5.76	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	8.48	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	11.07	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	12.91	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	13.63	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	13.03	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	11.22	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	8.68	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	5.85	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	3.45	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	0.75	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	0.00	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	0.00	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.00	831.764	0.00	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.01	954.993	0.00	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	0.32	1096.478	0.00		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	1.53	1258.925	0.00		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S147 - Average

SOP Name:

Measured:
Wednesday, October 22, 2008 4:13:42 PM

Sample Source & type:
Kallar

Measured by:
student

Analysed:
Wednesday, October 22, 2008 4:13:43 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
20.52 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.716 %

Result Emulation:
Off

Concentration:
0.3858 %Vol

Span :
1.448

Uniformity:
0.458

Result units:
Volume

Specific Surface Area:
0.0488 m²/g

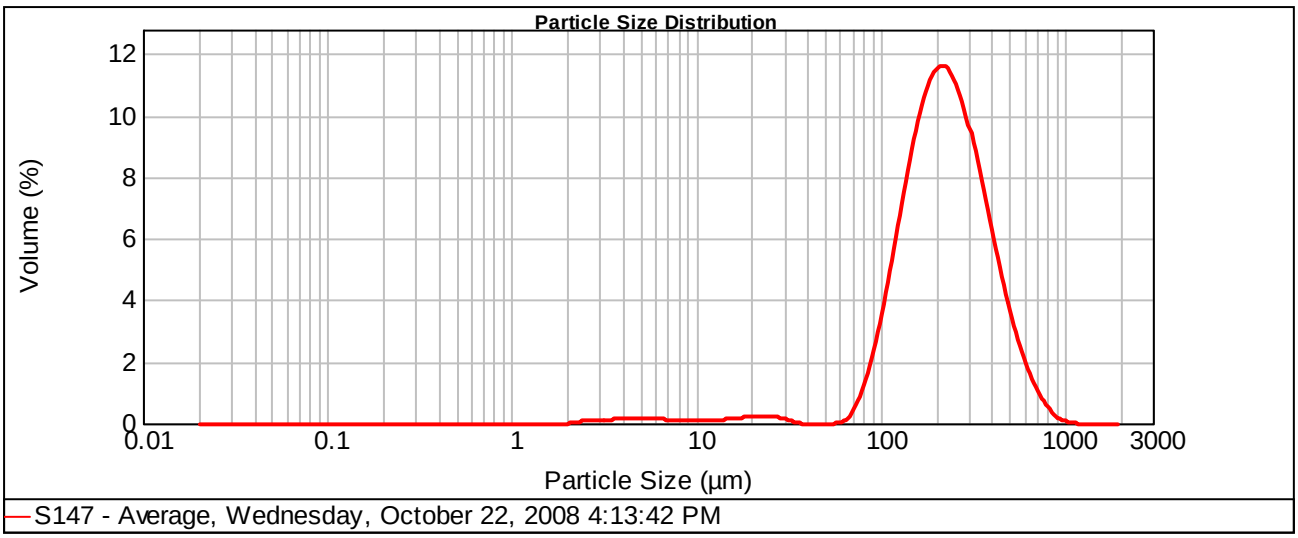
Surface Weighted Mean D[3,2]:
122.871 um

Vol. Weighted Mean D[4,3]:
252.140 um

---

d(0.1): 114.609 um **d(0.5):** 221.512 um **d(0.9):** 435.343 um

---



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.09	120.226	6.20	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.11	138.038	7.96	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.14	158.489	9.39	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.18	181.970	10.28	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.21	208.930	10.48	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.07	22.909	0.21	239.883	10.00	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.09	26.303	0.17	275.423	8.96	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.10	30.200	0.07	316.228	7.52	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.12	34.674	0.00	363.078	5.95	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.13	39.811	0.00	416.869	4.41	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.13	45.709	0.00	478.630	3.07	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.13	52.481	0.00	549.541	1.99	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.13	60.256	0.00	630.957	1.18	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.12	69.183	0.09	724.436	0.61	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.11	79.433	0.57	831.764	0.22	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.10	91.201	1.47	954.993	0.06	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.08	104.713	2.75	1096.478	0.00		
0.105	0.00	1.096	0.00	11.482	0.08	120.226	4.40	1258.925	0.00		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S148 - Average

SOP Name:

Measured:
Wednesday, October 22, 2008 4:23:01 PM

Sample Source & type:
Pushpavanam

Measured by:
student

Analysed:
Wednesday, October 22, 2008 4:23:02 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
23.47 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.638 %

Result Emulation:
Off

Concentration:
0.5912 %Vol

Span :
1.090

Uniformity:
0.339

Result units:
Volume

Specific Surface Area:
0.0383 m²/g

Surface Weighted Mean D[3,2]:
156.489 um

Vol. Weighted Mean D[4,3]:
201.018 um

d(0.1): 109.573 um **d(0.5):** 188.520 um **d(0.9):** 315.100 um

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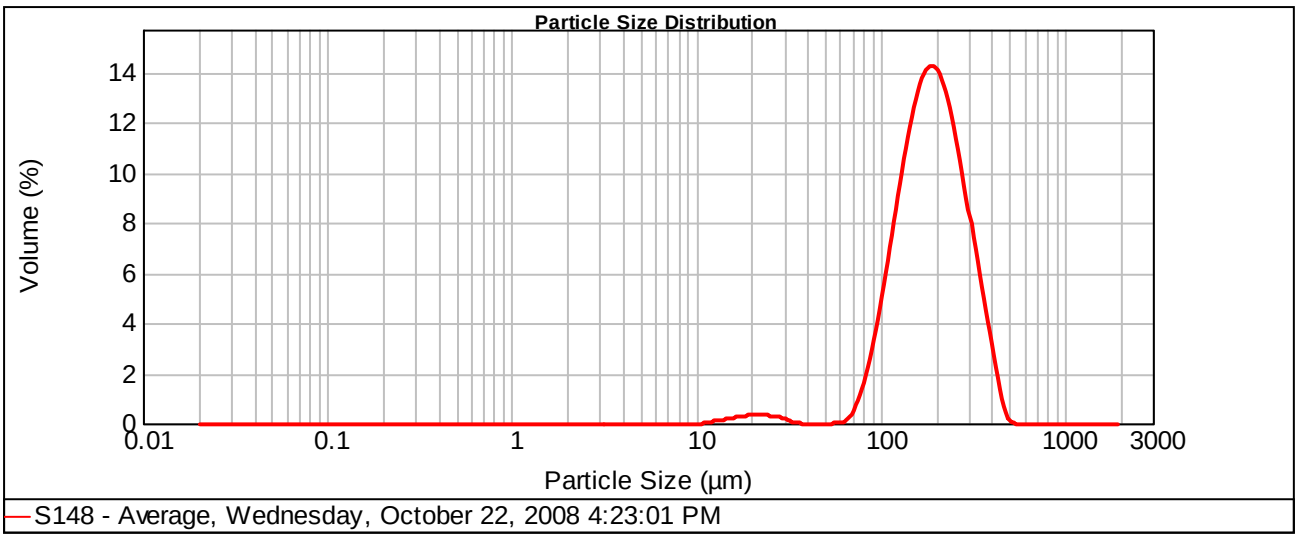

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.07	120.226	8.75	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.13	138.038	10.99	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.21	158.489	12.47	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.27	181.970	12.89	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.31	208.930	12.15	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.29	239.883	10.40	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.21	275.423	8.05	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.08	316.228	5.53	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	3.23	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	1.03	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	0.03	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	0.00	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	0.00	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.08	724.436	0.00	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.71	831.764	0.00	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	1.99	954.993	0.00	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	3.87	1096.478	0.00		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	6.25	1258.925	0.00		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S149 - Average

SOP Name:

Measured:
Wednesday, October 22, 2008 4:31:28 PM

Sample Source & type:
Pushpavanam

Measured by:
student

Analysed:
Wednesday, October 22, 2008 4:31:30 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
19.08 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.836 %

Result Emulation:
Off

Concentration:
0.4907 %Vol

Span :
1.061

Uniformity:
0.328

Result units:
Volume

Specific Surface Area:
0.0369 m²/g

Surface Weighted Mean D[3,2]:
162.777 um

Vol. Weighted Mean D[4,3]:
196.904 um

d(0.1): 109.782 um **d(0.5):** 183.951 um **d(0.9):** 304.880 um

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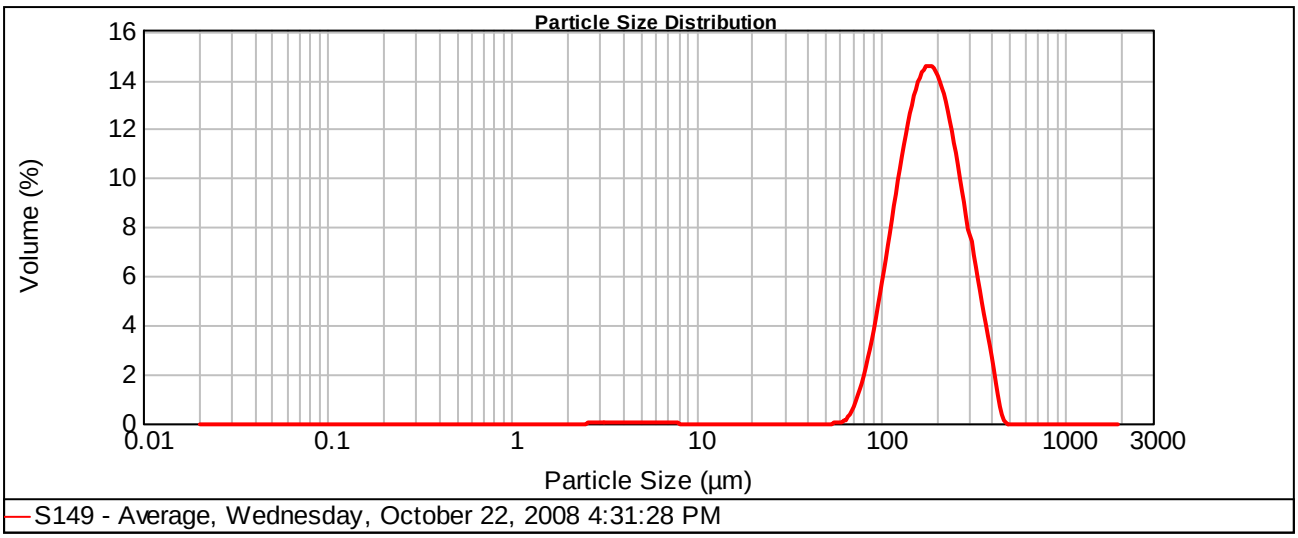

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	9.49	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	11.66	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	12.94	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	13.09	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	12.06	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	10.07	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.01	26.303	0.00	275.423	7.58	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.01	30.200	0.00	316.228	5.00	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.02	34.674	0.00	363.078	2.81	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.02	39.811	0.00	416.869	0.43	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.02	45.709	0.00	478.630	0.00	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.02	52.481	0.00	549.541	0.00	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.02	60.256	0.00	630.957	0.00	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.01	69.183	0.13	724.436	0.00	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.01	79.433	0.90	831.764	0.00	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	2.36	954.993	0.00	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	4.42	1096.478	0.00		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	6.94	1258.925	0.00		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S150 - Average

SOP Name:

Measured:
Wednesday, October 22, 2008 4:41:39 PM

Sample Source & type:
Viludamavadi North

Measured by:
student

Analysed:
Wednesday, October 22, 2008 4:41:41 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
18.82 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.745 %

Result Emulation:
Off

Concentration:
0.6267 %Vol

Span :
1.101

Uniformity:
0.34

Result units:
Volume

Specific Surface Area:
0.0283 m²/g

Surface Weighted Mean D[3,2]:
211.819 um

Vol. Weighted Mean D[4,3]:
247.891 um

d(0.1): 135.298 um **d(0.5):** 229.823 um **d(0.9):** 388.420 um

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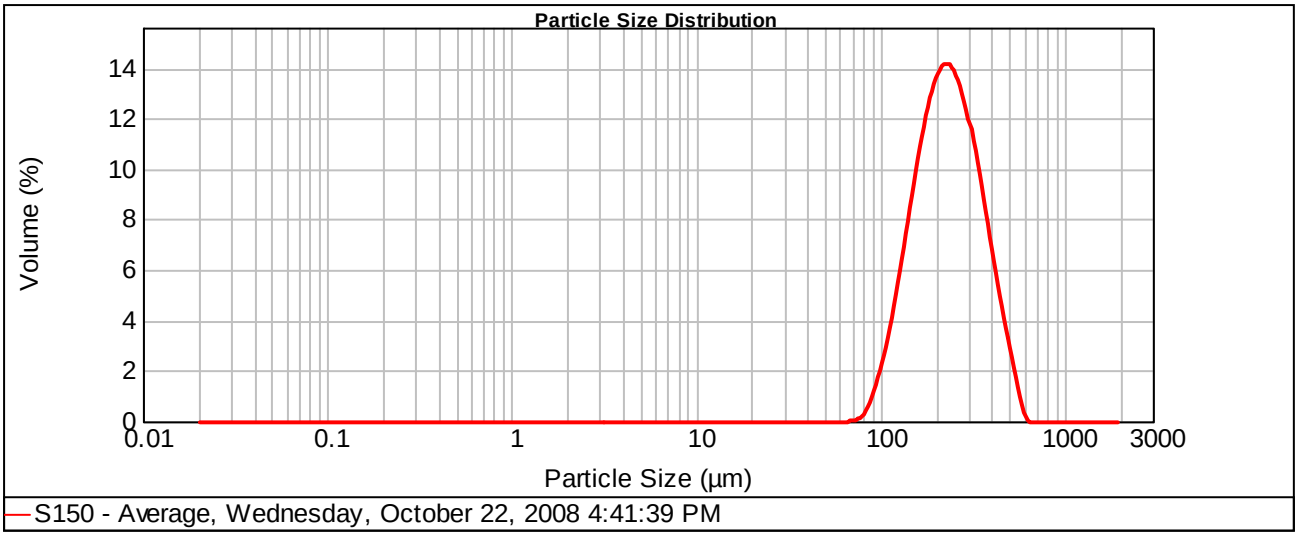

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	5.49	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	7.97	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	10.27	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	12.01	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	12.78	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	12.44	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	11.08	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	8.97	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	6.57	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	4.26	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	2.27	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	0.42	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	0.00	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	0.00	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.06	831.764	0.00	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.47	954.993	0.00	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	1.63	1096.478	0.00		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	3.29	1258.925	0.00		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S151 - Average

SOP Name:

Measured:
Wednesday, October 22, 2008 4:48:57 PM

Sample Source & type:
Viludamavadi North

Measured by:
student

Analysed:
Wednesday, October 22, 2008 4:48:58 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
20.40 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.744 %

Result Emulation:
Off

Concentration:
0.5710 %Vol

Span :
1.121

Uniformity:
0.351

Result units:
Volume

Specific Surface Area:
0.0339 m²/g

Surface Weighted Mean D[3,2]:
177.001 um

Vol. Weighted Mean D[4,3]:
226.593 um

d(0.1): 121.493 um **d(0.5):** 211.370 um **d(0.9):** 358.500 um

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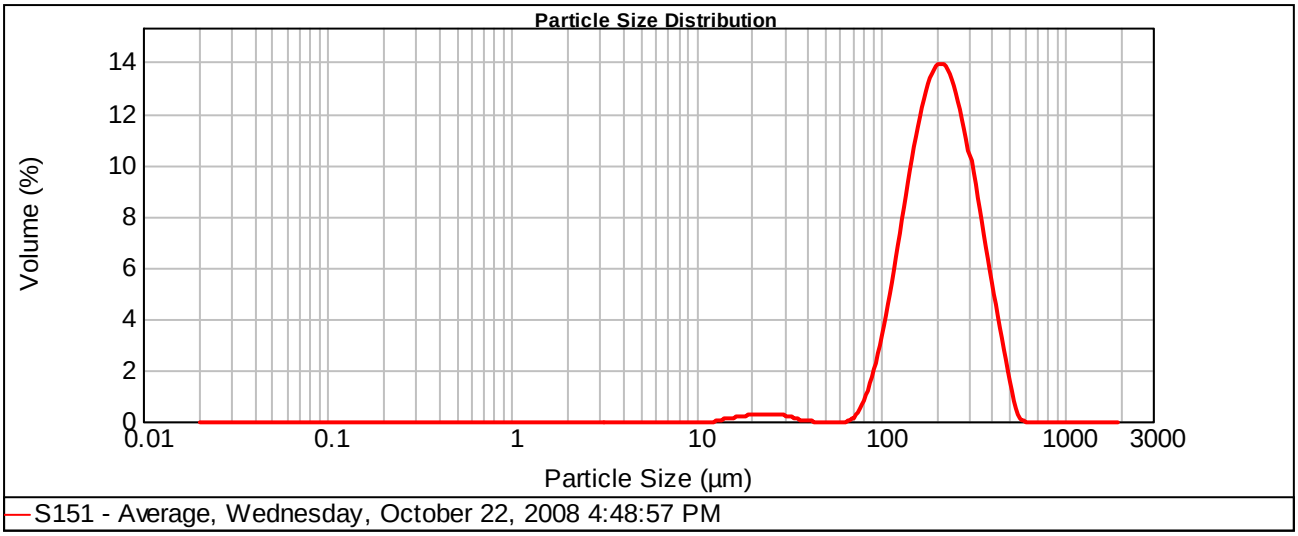


Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	6.74	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.07	138.038	9.14	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.14	158.489	11.12	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.20	181.970	12.35	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.25	208.930	12.54	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.27	239.883	11.64	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.24	275.423	9.88	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.15	316.228	7.60	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.04	363.078	5.25	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	3.09	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	1.04	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	0.02	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	0.00	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.25	724.436	0.00	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	1.08	831.764	0.00	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	2.46	954.993	0.00	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	4.43	1096.478	0.00		
0.105	0.00	1.096	0.00	11.482	0.00	120.226		1258.925	0.00		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S152 - Average

SOP Name:

Measured:
Wednesday, October 22, 2008 4:57:38 PM

Sample Source & type:
Puthupalli

Measured by:
student

Analysed:
Wednesday, October 22, 2008 4:57:39 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
19.15 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.825 %

Result Emulation:
Off

Concentration:
0.6004 %Vol

Span :
1.283

Uniformity:
0.395

Result units:
Volume

Specific Surface Area:
0.0301 m²/g

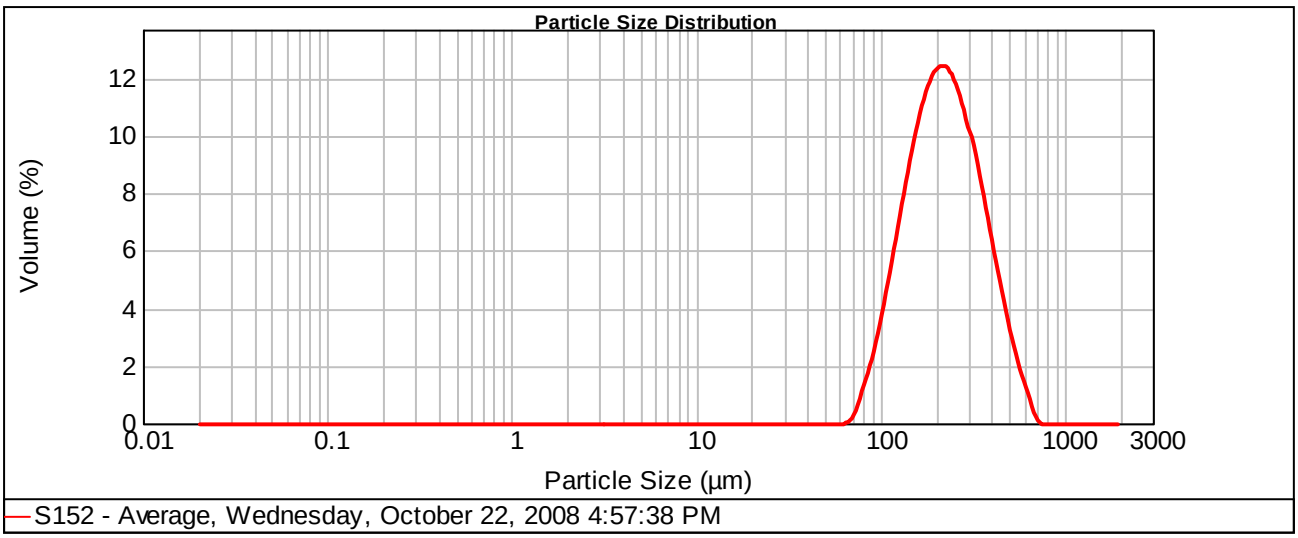
Surface Weighted Mean D[3,2]:
199.190 um

Vol. Weighted Mean D[4,3]:
244.154 um

---

d(0.1): 121.143 um **d(0.5):** 219.912 um **d(0.9):** 403.271 um

---



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	6.61	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	8.50	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	10.02	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	11.00	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	11.24	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	10.72	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	9.55	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	7.90	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	6.06	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	4.27	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	2.66	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	1.43	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.01	630.957	0.35	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.48	724.436	0.00	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	1.57	831.764	0.00	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	2.93	954.993	0.00	10000.000	
0.091	0.00	0.955	0.00	10.000	0.00	104.713	4.70	1096.478	0.00		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S153 - Average

SOP Name:

Measured:
Wednesday, October 22, 2008 5:04:56 PM

Sample Source & type:
Puthupalli

Measured by:
student

Analysed:
Wednesday, October 22, 2008 5:04:57 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
19.02 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.619 %

Result Emulation:
Off

Concentration:
0.2788 %Vol

Span :
1.035

Uniformity:
0.334

Result units:
Volume

Specific Surface Area:
0.062 m²/g

Surface Weighted Mean D[3,2]:
96.765 um

Vol. Weighted Mean D[4,3]:
189.494 um

d(0.1): 105.457 um **d(0.5):** 181.850 um **d(0.9):** 293.616 um

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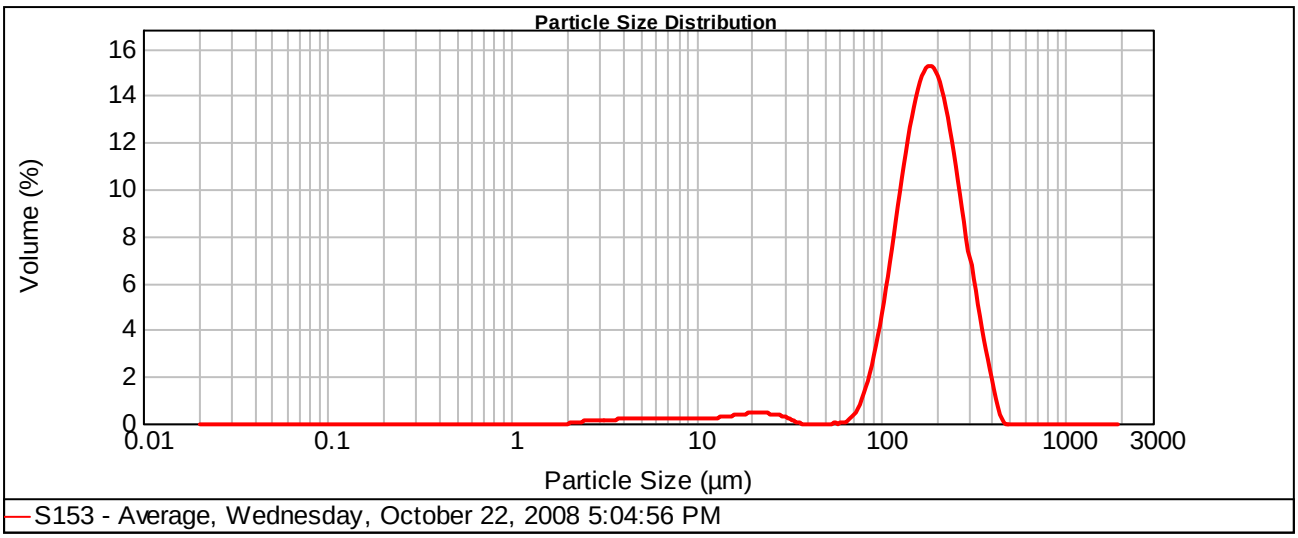

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.19	120.226	9.04	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.25	138.038	11.73	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.31	158.489	13.43	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.37	181.970	13.72	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.40	208.930	12.49	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.07	22.909	0.39	239.883	10.06	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.10	26.303	0.31	275.423	7.12	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.12	30.200	0.13	316.228	4.28	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.14	34.674	0.00	363.078	2.05	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.16	39.811	0.00	416.869	0.22	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.18	45.709	0.00	478.630	0.00	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.18	52.481	0.00	549.541	0.00	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.18	60.256	0.05	630.957	0.00	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.17	69.183	0.49	724.436	0.00	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.16	79.433	1.61	831.764	0.00	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.15	91.201	3.49	954.993	0.00	10000.000	
0.091	0.00	0.955	0.00	10.000	0.16	104.713	6.12	1096.478	0.00		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S154 - Average

SOP Name:

Measured:
Wednesday, October 22, 2008 4:57:38 PM

Sample Source & type:
Karaikal

Measured by:
student

Analysed:
Wednesday, October 22, 2008 4:57:39 PM

Sample bulk lot ref:
Pit1

Result Source:
Edited

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
19.15 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.825 %

Result Emulation:
Off

Concentration:
0.6004 %Vol

Span :
1.283

Uniformity:
0.395

Result units:
Volume

Specific Surface Area:
0.0301 m²/g

Surface Weighted Mean D[3,2]:
199.190 um

Vol. Weighted Mean D[4,3]:
244.154 um

d(0.1): 121.143 um **d(0.5):** 219.912 um **d(0.9):** 403.271 um

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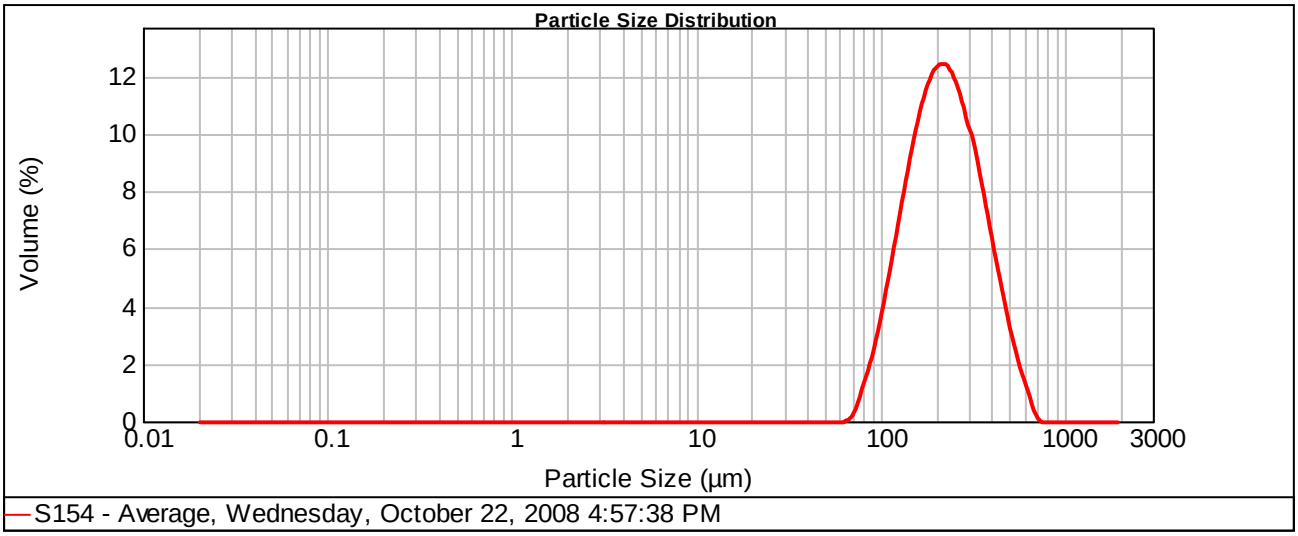

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	6.61	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	8.50	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	10.02	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	11.00	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	11.24	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	10.72	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	9.55	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	7.90	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	6.06	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	4.27	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	2.66	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	1.43	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.01	630.957	0.35	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.48	724.436	0.00	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	1.57	831.764	0.00	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	2.93	954.993	0.00	10000.000	
0.091	0.00	0.955	0.00	10.000	0.00	104.713	4.70	1096.478	0.00		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S155 - Average

SOP Name:

Measured:
Wednesday, October 22, 2008 5:04:56 PM

Sample Source & type:
Karaikal

Measured by:
student

Analysed:
Wednesday, October 22, 2008 5:04:57 PM

Sample bulk lot ref:
Pit1

Result Source:
Edited

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
19.02 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.619 %

Result Emulation:
Off

Concentration:
0.2788 %Vol

Span :
1.035

Uniformity:
0.334

Result units:
Volume

Specific Surface Area:
0.062 m²/g

Surface Weighted Mean D[3,2]:
96.765 um

Vol. Weighted Mean D[4,3]:
189.494 um

d(0.1): 105.457 um **d(0.5):** 181.850 um **d(0.9):** 293.616 um

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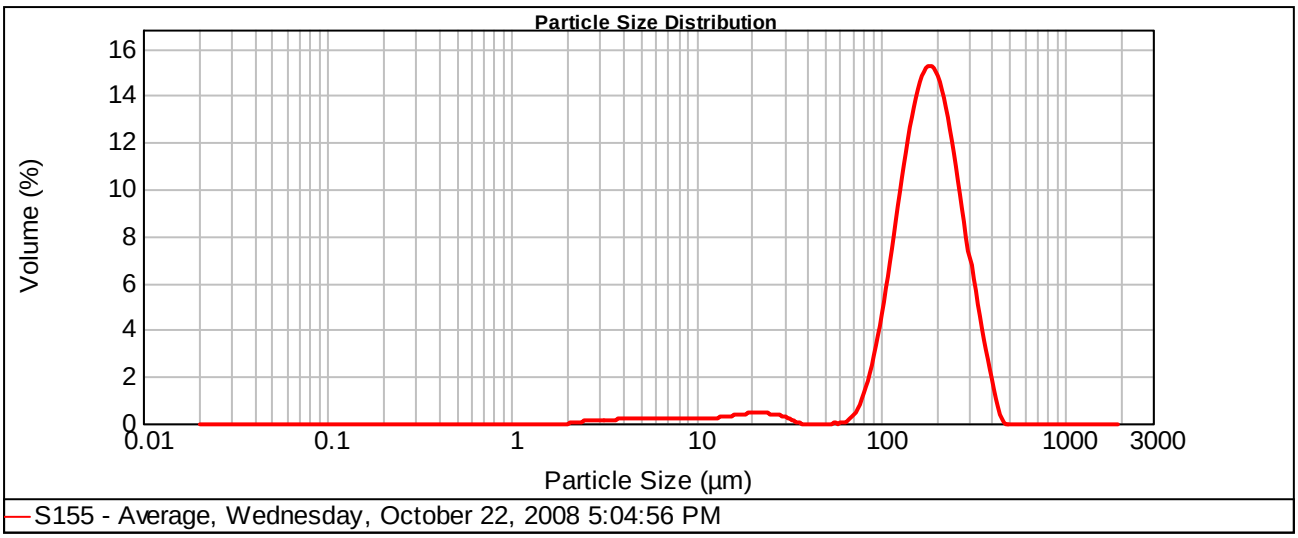


Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.19	120.226	9.04	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.25	138.038	11.73	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.31	158.489	13.43	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.37	181.970	13.72	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.40	208.930	12.49	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.07	22.909	0.39	239.883	10.06	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.10	26.303	0.31	275.423	7.12	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.12	30.200	0.13	316.228	4.28	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.14	34.674	0.00	363.078	2.05	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.16	39.811	0.00	416.869	0.22	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.18	45.709	0.00	478.630	0.00	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.18	52.481	0.00	549.541	0.00	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.18	60.256	0.05	630.957	0.00	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.17	69.183	0.49	724.436	0.00	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.16	79.433	1.61	831.764	0.00	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.15	91.201	3.49	954.993	0.00	10000.000	
0.091	0.00	0.955	0.00	10.000	0.16	104.713	6.12	1096.478	0.00		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S156 - Average

SOP Name:

Measured:
Wednesday, October 29, 2008 2:47:35 PM

Sample Source & type:
Tranquebar

Measured by:
student

Analysed:
Wednesday, October 29, 2008 2:47:37 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
23.21 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.481 %

Result Emulation:
Off

Concentration:
0.0994 %Vol

Span :
1.913

Uniformity:
0.543

Result units:
Volume

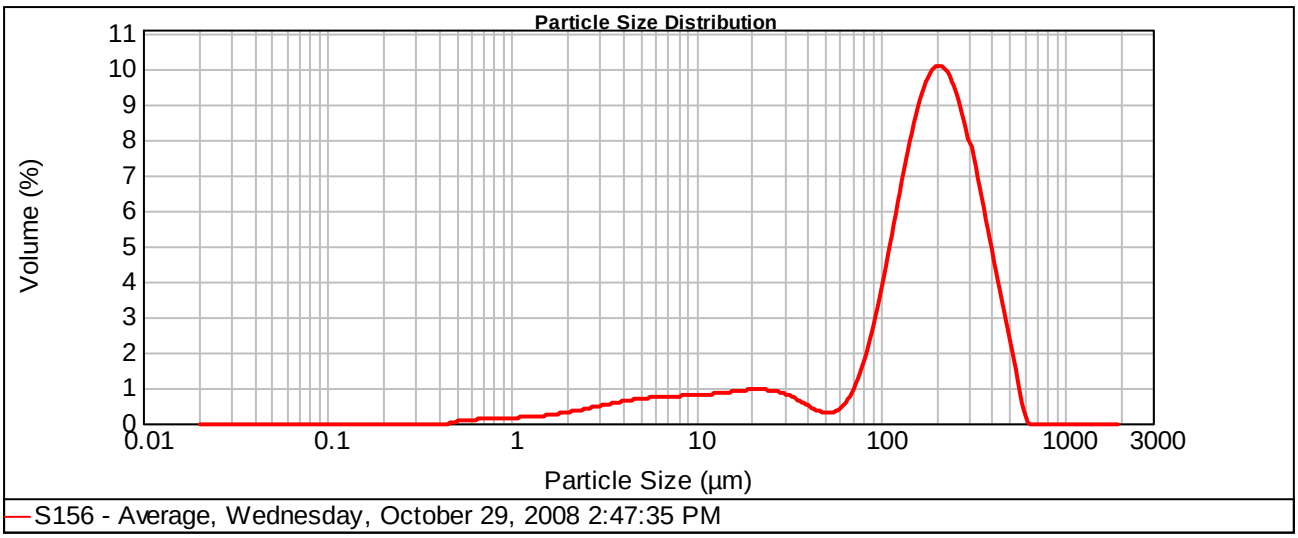
Specific Surface Area:
0.227 m²/g

Surface Weighted Mean D[3,2]:
26.489 um

Vol. Weighted Mean D[4,3]:
193.383 um

---

d(0.1): 14.350 um **d(0.5):** 183.042 um **d(0.9):** 364.574 um



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.16	11.482	0.75	120.226	5.99	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.18	13.183	0.78	138.038	7.39	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.21	15.136	0.82	158.489	8.46	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.24	17.378	0.85	181.970	9.06	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.29	19.953	0.87	208.930	9.07	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.35	22.909	0.86	239.883	8.51	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.40	26.303	0.80	275.423	7.48	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.46	30.200	0.69	316.228	6.11	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.52	34.674	0.54	363.078	4.66	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.57	39.811	0.39	416.869	3.22	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.61	45.709	0.28	478.630	1.89	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.65	52.481	0.30	549.541	0.39	5754.399	0.00
0.052	0.00	0.550	0.06	5.754	0.67	60.256	0.53	630.957	0.00	6606.934	0.00
0.060	0.00	0.631	0.09	6.607	0.69	69.183	1.05	724.436	0.00	7585.776	0.00
0.069	0.00	0.724	0.11	7.586	0.70	79.433	1.91	831.764	0.00	8709.636	0.00
0.079	0.00	0.832	0.12	8.710	0.71	91.201	3.08	954.993	0.00	10000.000	0.00
0.091	0.00	0.955	0.13	10.000	0.73	104.713	4.50	1096.478	0.00		
0.105	0.00	1.096	0.14	11.482	0.73	120.226	4.50	1258.925	0.00		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S157 - Average

SOP Name:

Measured:
Wednesday, October 29, 2008 2:58:13 PM

Sample Source & type:
Tranquebar

Measured by:
student

Analysed:
Wednesday, October 29, 2008 2:58:14 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
20.94 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.502 %

Result Emulation:
Off

Concentration:
0.0672 %Vol

Span :
1.852

Uniformity:
0.525

Result units:
Volume

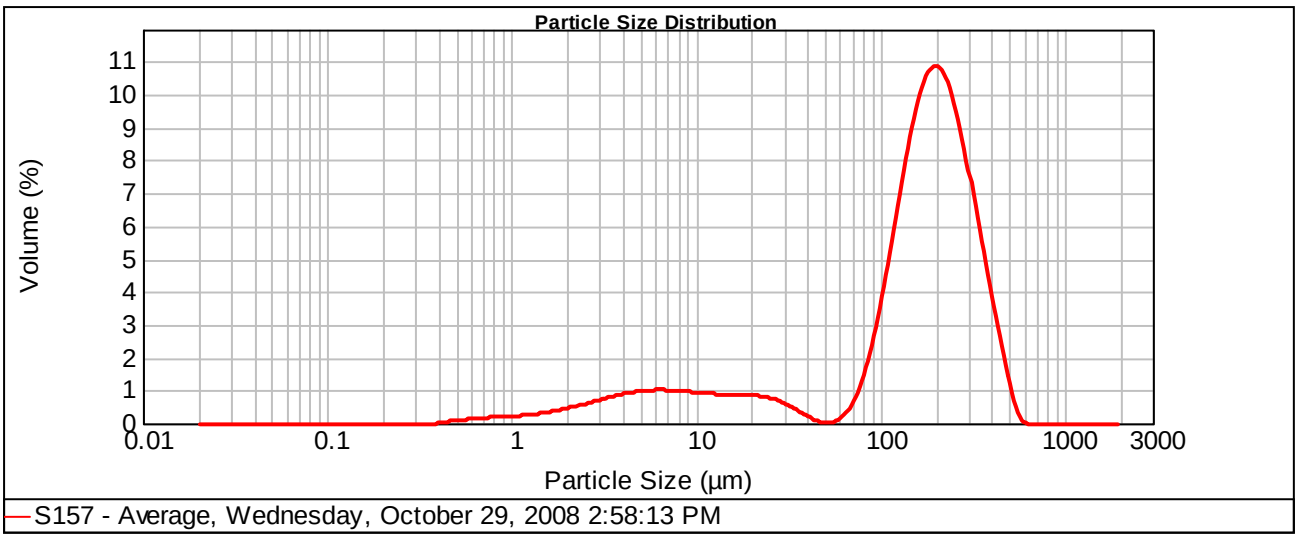
Specific Surface Area:
0.303 m²/g

Surface Weighted Mean D[3,2]:
19.799 um

Vol. Weighted Mean D[4,3]:
180.040 um

d(0.1): 8.268 um **d(0.5):** 175.817 um **d(0.9):** 333.809 um

---



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.22	11.482	0.82	120.226	6.41	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.25	13.183	0.80	138.038	8.07	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.30	15.136	0.80	158.489	9.27	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.35	17.378	0.79	181.970	9.82	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.42	19.953	0.77	208.930	9.60	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.50	22.909	0.71	239.883	8.65	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.58	26.303	0.61	275.423	7.19	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.67	30.200	0.46	316.228	5.46	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.75	34.674	0.28	363.078	3.77	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.82	39.811	0.12	416.869	2.24	4365.158	0.00
0.040	0.00	0.417	0.05	4.365	0.87	45.709	0.01	478.630	0.83	5011.872	0.00
0.046	0.00	0.479	0.09	5.012	0.91	52.481	0.06	549.541	0.05	5754.399	0.00
0.052	0.00	0.550	0.12	5.754	0.92	60.256	0.27	630.957	0.00	6606.934	0.00
0.060	0.00	0.631	0.15	6.607	0.92	69.183	0.78	724.436	0.00	7585.776	0.00
0.069	0.00	0.724	0.17	7.586	0.90	79.433	1.69	831.764	0.00	8709.636	0.00
0.079	0.00	0.832	0.19	8.710	0.87	91.201	2.99	954.993	0.00	10000.000	0.00
0.091	0.00	0.955	0.20	10.000	0.84	104.713	4.64	1096.478	0.00		
0.105	0.00	1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S158 - Average

SOP Name:

Measured:
Wednesday, October 29, 2008 3:07:48 PM

Sample Source & type:
Cuddalore

Measured by:
student

Analysed:
Wednesday, October 29, 2008 3:07:50 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
21.82 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.720 %

Result Emulation:
Off

Concentration:
0.7831 %Vol

Span :
1.047

Uniformity:
0.325

Result units:
Volume

Specific Surface Area:
0.0268 m²/g

Surface Weighted Mean D[3,2]:
224.143 um

Vol. Weighted Mean D[4,3]:
258.884 um

d(0.1): 145.352 um **d(0.5):** 241.974 um **d(0.9):** 398.667 um

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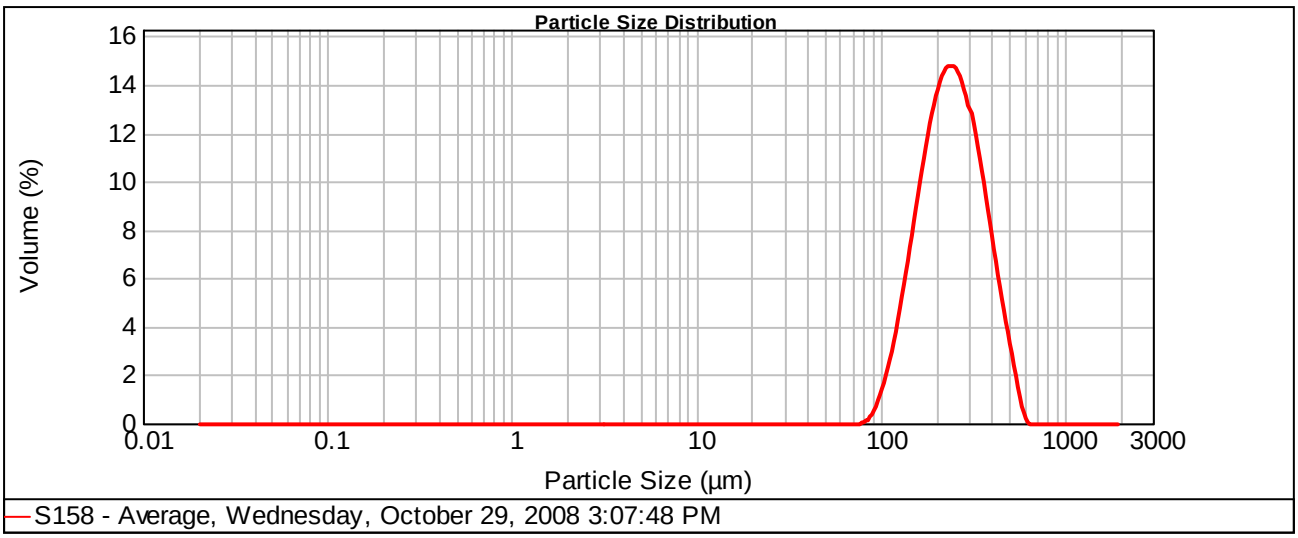

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.00	120.226	4.38	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.00	138.038	6.95	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.00	158.489	9.56	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.00	181.970	11.80	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.00	208.930	13.13	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.00	239.883	13.26	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.00	26.303	0.00	275.423	12.16	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.00	30.200	0.00	316.228	10.07	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.00	34.674	0.00	363.078	7.46	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.00	39.811	0.00	416.869	4.85	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.00	45.709	0.00	478.630	2.57	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.00	52.481	0.00	549.541	0.47	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.00	60.256	0.00	630.957	0.00	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.00	69.183	0.00	724.436	0.00	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.00	79.433	0.13	831.764	0.00	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.00	91.201	0.89	954.993	0.00	10000.000	0.00
0.091	0.00	0.955	0.00	10.000	0.00	104.713	2.32	1096.478	0.00		
0.105	0.00	1.096	0.00	11.482	0.00	120.226	2.32	1258.925	0.00		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S159 - Average

SOP Name:

Measured:
Wednesday, October 29, 2008 3:15:51 PM

Sample Source & type:
Cuddalore

Measured by:
student

Analysed:
Wednesday, October 29, 2008 3:15:52 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
17.68 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.526 %

Result Emulation:
Off

Concentration:
0.3227 %Vol

Span :
1.151

Uniformity:
0.366

Result units:
Volume

Specific Surface Area:
0.0492 m²/g

Surface Weighted Mean D[3,2]:
121.999 um

Vol. Weighted Mean D[4,3]:
261.880 um

d(0.1): 136.789 um **d(0.5):** 246.388 um **d(0.9):** 420.283 um

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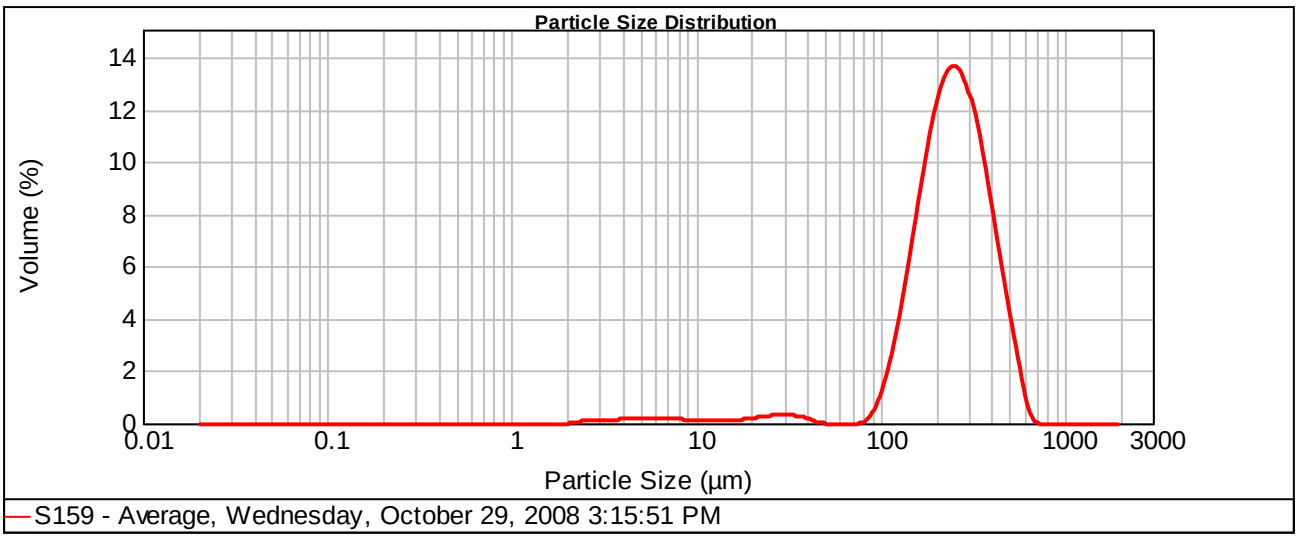

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.09	120.226	3.90	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.09	138.038	6.17	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.11	158.489	8.52	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.15	181.970	10.61	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.20	208.930	11.98	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.07	22.909	0.26	239.883	12.36	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.09	26.303	0.29	275.423	11.68	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.11	30.200	0.29	316.228	10.07	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.13	34.674	0.22	363.078	7.90	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.14	39.811	0.10	416.869	5.56	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.16	45.709	0.00	478.630	3.40	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.16	52.481	0.00	549.541	1.34	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.16	60.256	0.00	630.957	0.09	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.16	69.183	0.00	724.436	0.00	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.14	79.433	0.15	831.764	0.00	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.12	91.201	0.82	954.993	0.00	10000.000	
0.091	0.00	0.955	0.00	10.000	0.10	104.713	2.09	1096.478	0.00		
0.105		1.096		11.482		120.226		1258.925			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
S160 - Average

SOP Name:

Measured:
Wednesday, October 29, 2008 3:24:32 PM

Sample Source & type:
Cuddalore

Measured by:
student

Analysed:
Wednesday, October 29, 2008 3:24:34 PM

Sample bulk lot ref:
Pit1

Result Source:
Averaged

Particle Name:
Default

Accessory Name:
Hydro 2000G (A)

Analysis model:
General purpose

Sensitivity:
Normal

Particle RI:
1.520

Absorption:
0.1

Size range:
0.020 to 2000.000 um

Obscuration:
17.27 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.564 %

Result Emulation:
Off

Concentration:
0.4017 %Vol

Span :
1.143

Uniformity:
0.361

Result units:
Volume

Specific Surface Area:
0.039 m²/g

Surface Weighted Mean D[3,2]:
153.694 um

Vol. Weighted Mean D[4,3]:
286.772 um

d(0.1): 151.019 um **d(0.5):** 268.938 um **d(0.9):** 458.336 um

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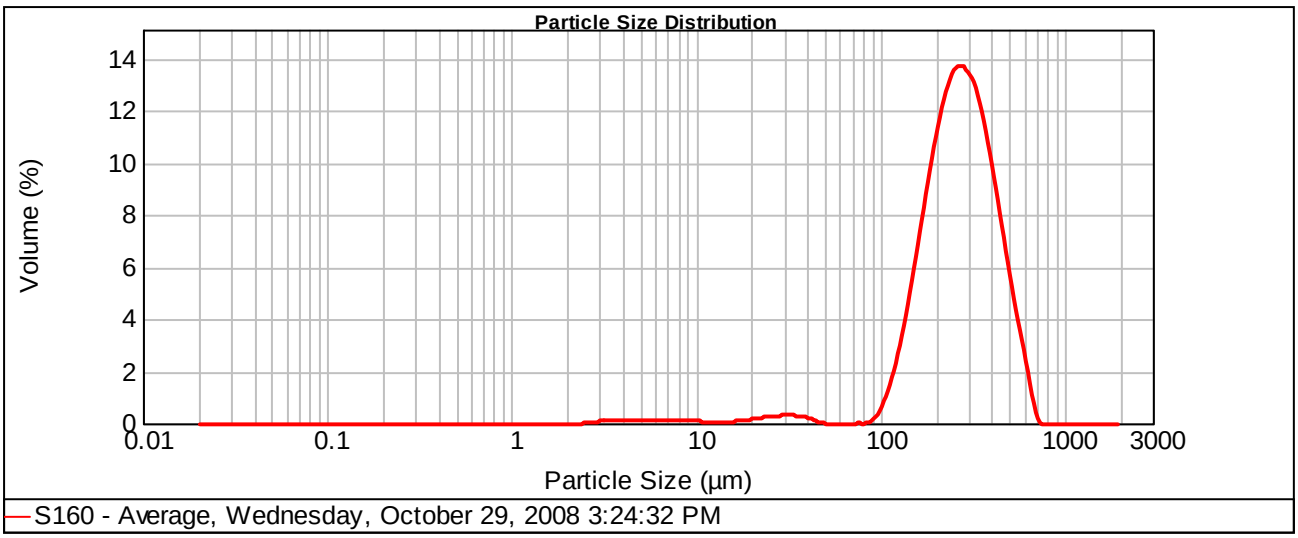

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.010	0.00	0.105	0.00	1.096	0.00	11.482	0.06	120.226	2.80	1258.925	0.00
0.011	0.00	0.120	0.00	1.259	0.00	13.183	0.01	138.038	4.84	1445.440	0.00
0.013	0.00	0.138	0.00	1.445	0.00	15.136	0.06	158.489	7.15	1659.587	0.00
0.015	0.00	0.158	0.00	1.660	0.00	17.378	0.12	181.970	9.47	1905.461	0.00
0.017	0.00	0.182	0.00	1.905	0.00	19.953	0.16	208.930	11.29	2187.762	0.00
0.020	0.00	0.209	0.00	2.188	0.00	22.909	0.22	239.883	12.30	2511.886	0.00
0.023	0.00	0.240	0.00	2.512	0.04	26.303	0.27	275.423	12.26	2884.032	0.00
0.026	0.00	0.275	0.00	2.884	0.08	30.200	0.28	316.228	11.19	3311.311	0.00
0.030	0.00	0.316	0.00	3.311	0.09	34.674	0.24	363.078	9.33	3801.894	0.00
0.035	0.00	0.363	0.00	3.802	0.10	39.811	0.14	416.869	7.03	4365.158	0.00
0.040	0.00	0.417	0.00	4.365	0.11	45.709	0.00	478.630	4.70	5011.872	0.00
0.046	0.00	0.479	0.00	5.012	0.12	52.481	0.00	549.541	2.69	5754.399	0.00
0.052	0.00	0.550	0.00	5.754	0.12	60.256	0.00	630.957	0.66	6606.934	0.00
0.060	0.00	0.631	0.00	6.607	0.12	69.183	0.00	724.436	0.00	7585.776	0.00
0.069	0.00	0.724	0.00	7.586	0.10	79.433	0.01	831.764	0.00	8709.636	0.00
0.079	0.00	0.832	0.00	8.710	0.09	91.201	0.38	954.993	0.00	10000.000	
0.091	0.00	0.955	0.00	10.000	0.07	104.713	1.31	1096.478	0.00		
0.105		1.096		11.482		120.226		1258.925			

Operator notes: